CHUYKO, A.V. (Rostov-na-Donu)

Mineral binding materials. Khim. v. shkole 15 no.6:3-18 N-D '60.
(MIRA 13:11)

(Binding materials)

PARAMONOV, G.A., inzh.; PICHUGIN, A.A., kand.tekhn.nauk; VANEYEV, V.A., inzh.; KUZ'MINSKIY, A.G., inzh.; CHUYKO, A.V., kand.tekhn.nauk; VRUBLEVSKIY, L.Ye., inzh.; FURMAN, A.Ya., inzh. [deceased]; PEGANOV, G.N., inzh.; SHEFANOV, A.S., inzh.; DMITRIYEV, P.A., kand.tekhn.nauk; IVANOV, I.A., kand.tekhn.nauk; TEMKO, Yu.P., dotsent; SOKOLOV, P.K., dotsent; KANYUKA, N.S., kand.tekhn.nauk; SHPAKOVSKAYA, L.I., red.; GOSTISHCHEVA, Ye.M., tekhn.red.

[Handbook for the master builder on the technology of general building operations] Spravochnik mastera-stroitelia po tekhnologii proizvodstva obshchestroitel'nykh rabot. 2. izd.perer. i dop. Novosibirsk, Novosibirskoe knizhnoe izd-vo, 1961. 713 p. (MIRA 15:2)

(Building)

CHUYKO, N.

Mechanizing the drying of sand. Zhil.-kom.khoz. 11 no.6:12-13 Je '61. (MIRA 14:7)

1. Glavnyy inzhener trambaynogo upravleniya, Vladivostok.
(Vladivostok—Sand—Drying)

CHUYKO, A.V.

Building materials made of polymers. Khim. v shkole 17 no.1:13-26 Ja-F '62. (MIRA 15:1)

1. Inzhenerno-stroitel'nyy institut, Rostov-na-Donu.
(Building materials)
(Polymers)

CHUYKO, Aleksandr Vladimirovich; YARTSEV, N., red.; USTINOVA, S., tekhn. red.

[Artificial types of stone]Iskusstvennye kamni. Moskva, Mosk. rabochii, 1962. 199 p. (MIRA 16:3)
(Building materials industry)

CHUYKO, A.V., kand.tekhn.nauk; ROMODANOV, A.N., inzh.

Concrete corrosion at meat-packing plants. Bet.i zhel.-bet. 9 no.5:219-221 My '63. (MIRA 16:6)
(Concrete--Corrosion) (Packing houses)

L 45196-65 EWG(s)-2/EWP(j)/EWT(m) Pc-4/Pw-4 RM
ACCESSION NR: AP5014969 UR/0228/64/000/007/003/004

21
B

AUTHOR: Chuyko, A.V.(Candidate of technical sciences); Christova, Ye. M. (Candidate of technical sciences); Romodanov, A. N. (Engineer); Chuyko, Ye. S. (Engineer)

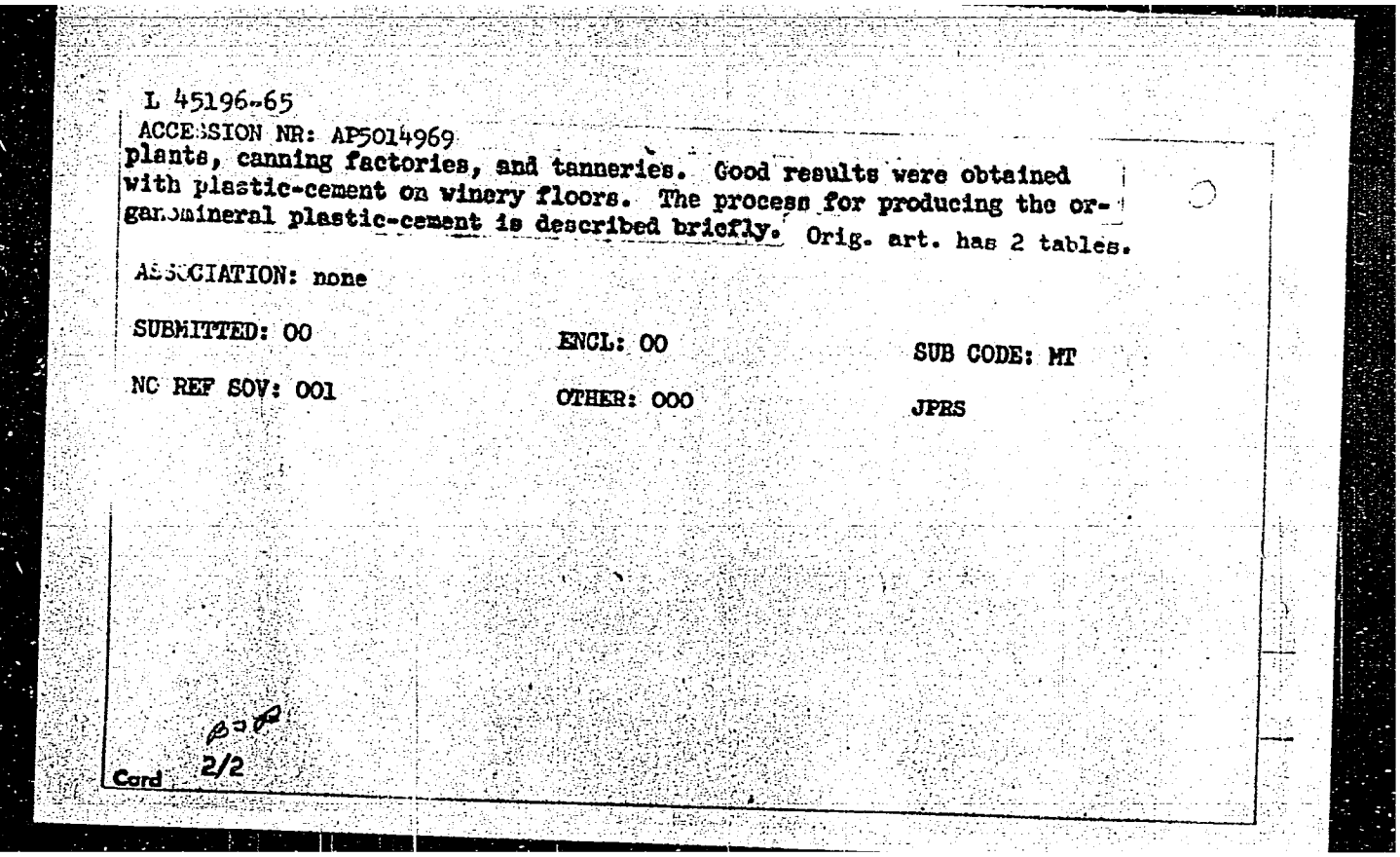
TITLE: Plastic-concrete based on the monomer FA

SOURCE: Stroitel'nyye materialy, no. 7, 1964, 3-4

TOPIC TAGS: monomer, cement, concrete

Abstract: As a result of the testing of various polymer-cement samples, it was decided to eliminate the mineral cement binder from the concrete composition. Furfural-acetone monomer, FA, strengthened with sulfobenzoic acid was used as the binder in the organomineral plastic cement. Dry quartz sand, free of lime inclusions was the acid resistant filler. The moisture content of the sand did not exceed 0.5%. The composition of the concrete was (in weight): monomer FA -- 16%; quartz sand -- 80%; sulfobenzoic acid -- 4%. The material was tested in melted pork fat and in grade I technical fat. The results of the investigation of the durability of plastic-cement indicated that this material can be considered sufficiently durable for floors where animal fats are found, as in food

Card 1/2



L 45196-65
ACCESSION NR: AP5014969
plants, canning factories, and tanneries. Good results were obtained with plastic-cement on winery floors. The process for producing the organomineral plastic-cement is described briefly. Orig. art. has 2 tables.

ASSOCIATION: none

SUBMITTED: 00 ENCL: 00 SUB CODE: MT

NO REF SOV: 001 OTHER: 000 JPRS

B-P

Card 2/2

CHUYKO, A.V., kand. tekhn. nauk; BOKOV, A.N., kand. med. nauk

Sanitary engineering requirements for structural plastics.
Stroi. mat. 10 no.10:5-7 O '64.

(MIRA 18:2)

CHUYKO, Aleksandr Vladimirovich

[Chemistry helps to build houses] Khimiia pomogaet stroit' doma. Moskva, Izd-vo "Znanie," 1964. 70 p. (Narodnyi universitet kul'tury: Tekhniko-ekonomicheskii fakul'tet, no.9) (MIRA 17:10)

POPOV, Nikolay [illegible], doktor tekhn. nauk, zasl.deyatel' nauki i tekhniki RSFSR; CHUYKO, Aleksandr Vladimirovich; RYB'YEV, I.A., doktor tekhn. nauk, prof., retsenzent

[Principles of the technology of structural products] Osnovy tekhnologii stroitel'nykh izdelii. Moskva, Stroiizdat, 1964. 214 p. (MIRA 17:9)

1. Vsesoyuznyy zaochnyy inzhenerno-stroitel'nyy institut (for Ryb'yev).

CHISTOVA, Ye.M., kand.tekhn.nauk; CHUYKO, A.V., kand.tekhn.nauk

Stability of ceramic floors in enterprises of the food industry. Stek. i ker. 21 no.10:34-35 O '64.
(MIRA 18:11)

1. Rostovskiy inshenerno-stroitel'nyy institut.

CHUYKO, A.V., kand.tekhn.nauk; CHISTOVA, Ye.M., kand.tekhn.nauk; ROMODANOV, A.N., inzh.; CHUYKO, Ye.S., inzh.

Floor deformations in enterprises of the canning industry. Prom. stroi. 42 no.2:19-21 '65. (MIRA 18:4)

CHUYKO, A.V., kand. tekhn. nauk

Corrosion of structural elements of dairy plants. Prom. stroi. 42 no.8:34-36 '65. (MIRA 18:9)

CHUYKO, A.V., kand. tekhn. nauk; PROSMUSHKIN, B.R., inzh.

Corrosion of floors in breweries. Prom. stroi. 43 no. 11: 36-38 '65. (MIRA 18:12)

VARSHAVSKIY, A.S.; SMIRNOV, I.A.; BATISHCHEV, V.A.; KANAYEV, G.Ye.; CHUYKO, F.M.; VETROV, V.D.; YURIN, B.A., red.; KOROBOVA, N.D., tekhn. red.

[Handclasp of millions] Rukopozhatie millionov. [By] A.S. Varshavskii i dr. Moskva, Profizdat, 1962. 270 p. (MIRA 16:4)

1. World Trade Union Congress. 5th, Moscow, 1961. (Trade unions--Congresses)

CHUYKO, B.T.

Contribution to the theory of separation of metals as basic salts in N.S.Fortunatov's units. Trudy po khim.i khim.tekh. no.1:80-84 '63. (MIRA 17:12)

S/109/63/008/003/016/027
D271/D308

AUTHORS: Chuyko, G. A., and Siprikov, I. V.

TITLE: Experimental investigation of the secondary emission of magnesium orthotitanate

PERIODICAL: Radiotekhnika i elektronika, v. 8, no. 3, 1963, 487-493

TEXT: A paper read at the 10th Conference for Cathode Electronics, Tashkent, November 1961. Experimentally collected data were presented of the secondary emission of $2MgO \cdot TiO_2$, mainly in graphs, in particular the importance of the activation, temperature dependence of the secondary emission, and energy distribution of secondary electrons. Magnesium orthotitanate is of interest because of its application in electron multipliers. The effectiveness of the material is greatly enhanced by activation in oxygen, at 0.01 mm Hg, at about 500°C, with about 10 min soak, followed by a similar period in vacuum. The coefficient

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of secondary emission after optimal activation was 3.8 at 500 V. After 20 hr in air, secondary emission decreased by 10%, after 1400 hr--by 30%, but the sample could be re-activated. The temperature coefficient of secondary emission depends on the duration and temperature of annealing in vacuum: 400°C, 2 - 3 hr does not affect it, but 500°C, 2 hr lowers it by 30%. The energy distribution of secondary electrons is centered on 3 eV. It was suggested, on the basis of x-ray analysis, that activation is associated with compensation of deficiencies in oxygen sites of the crystal lattice which have appeared during preliminary firing. Vacancies thus formed serve as traps for secondary electrons until they are filled in the activation process. Variations of the secondary emission due to annealing were attributed to chemical absorption of oxygen by magnesium orthotitanate which at 500°C proceeds at a noticeable speed. The authors acknowledge the valuable advice of P. K. Oshchepkov and L. M. Dun and the help in experimental work by I. I. Klochkova, T. I. Didus', Yu. N. Rusin, and V. I. Ivankov. There are 8 figures.

Experimental investigation... S/109/63/008/003/016/027
D271/D308

SUBMITTED: January 18, 1962

Card 3/3

L 12045-65 EWT(l)/EWG(k)/EWP(e)/EWT(m)/EPA(sp)-2/EPA(w)-2/EEC(t)/EEC(b)-2/
EWP(b)/EWA(m)-2/EWA(h) Pq-4/Pz-6/Pab-10/Peb IJP(c)/SSD/AFWL/ASD(a)-5/ESD(c)/
ACCESSION NR: AP4045312 ESD(dp)/ESD(gs)/ESD(t) S/0048/64/028/009/1516/1521
AT/WH

AUTHOR: Chuyko, G.A.; Faynberg, Ye.A.; Siprikov, I.V.; Grechanik, L.A.

TITLE: Secondary electron emission of hydrogen reduced high-lead glasses with enhanced surface conductivity /Report, Tenth Conference on Cathode Electronics held in Kiev, 11-18 Nov 1963/

SOURCE: AN SSSR. Izvestiya. Seriya fizicheskaya, v.28, no.9, 1964, 1516-1521

TOPIC TAGS: secondary emission, electron multiplier, glass, lead oxide, hydrogen reduction

ABSTRACT: The secondary emission coefficients and other properties of hydrogen-reduced high-lead glasses with enhanced surface conductivity were measured in order to assess the suitability of the materials for use as electrodes in electron multipliers in which the dynodes are not equipotential surfaces. Lead-silicate glasses containing a large proportion of PbO and having resistivities of 10^{11} to 10^{12} ohm-cm at 200°C were reduced in hydrogen at 380 to 450°C for 4 to 5 hours. The surface conduction of the resulting materials followed Ohm's law over a wide range of potential gradients, with surface resistivities from 10^{8} to 10^{10} ohm. The conductivity was

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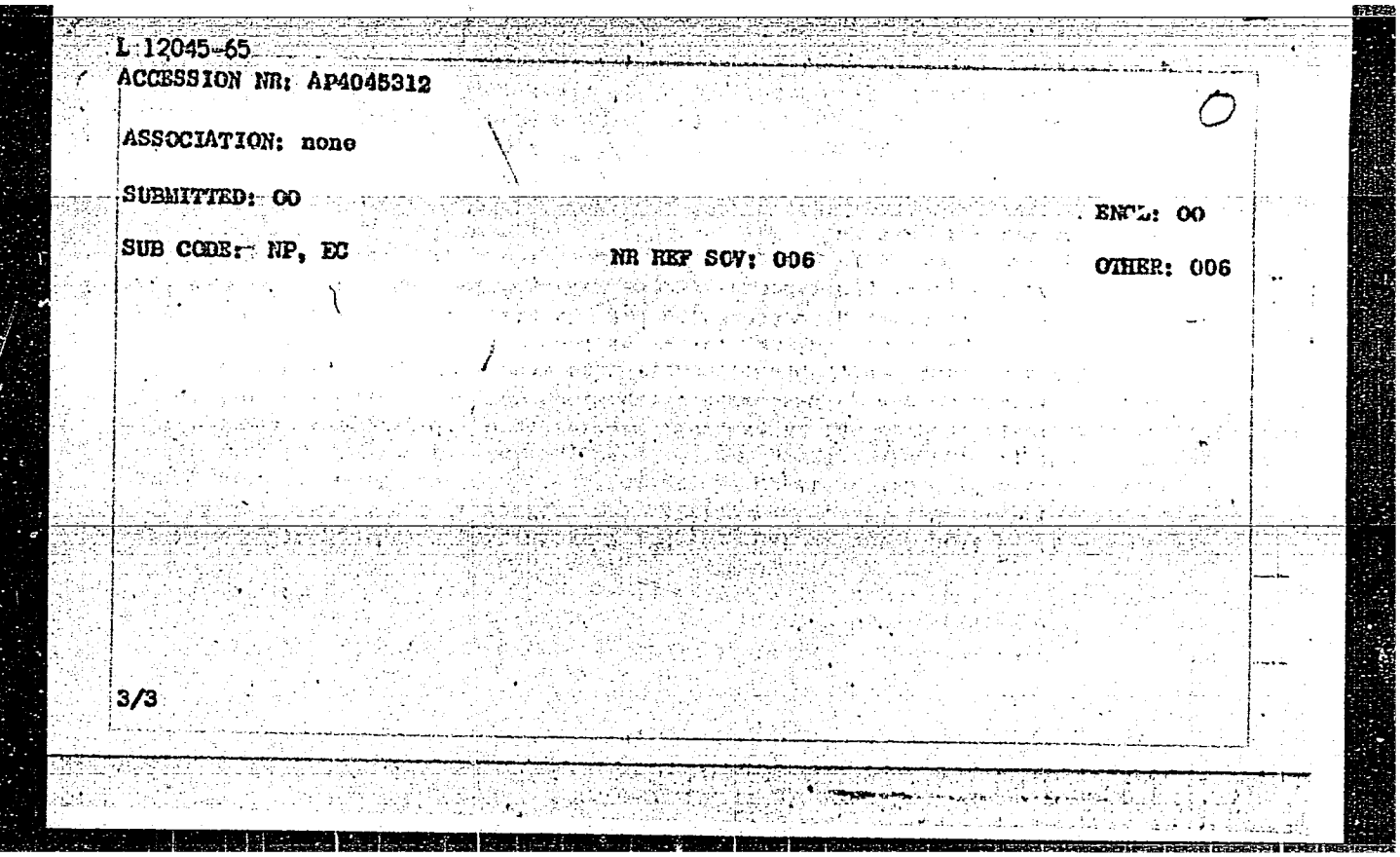
stable against prolonged heating at 200°C and against brief heating at 400°C. The temperature coefficient of surface resistivity was 0.3 to 0.4 percent per degree centigrade. Secondary emission coefficients as great as 4.5 were obtained at room temperature for incident electron energies of approximately 300 eV; the secondary emission decreased rapidly with further increase of the primary electron energy. The maximum secondary emission coefficient decreased by approximately 15% when the temperature was raised from room temperature to 340°C, and the secondary emission for high energy primaries increased somewhat. Examination of the energy distribution of the secondary electrons with the aid of a retarding field disclosed the presence of a considerable number of negative energy secondaries, i.e., secondary electrons that would leave the target only under the influence of an accelerating field. It is suggested that a positive charge develops within the target where the glass is still a good insulator. The secondary emission coefficient was practically unaffected by storage in air for a year. The secondary emission from a specimen subjected to continuous bombardment at 3×10^{-5} A/cm^2 decreased by 30% during the first 30 hours, by another 14% during the succeeding 50 hours, and thereafter remained constant for the remainder of the 120 hour test. It is concluded that hydrogen-reduced lead-silicate glass is a promising material for use in electron multiplier of special design. Orig.art.has: 9 figures.



L 12045-65
ACCESSION NR: AP4045312

ASSOCIATION: none

SUBMITTED: 00 ENCL: 00

SUB CODE: NP, EC NR REF SOV: 006 OTHER: 006

3/3

L 46953-66 EWT(l)/EWP(e)/EWT(m) WH

ACC NR: AP6031033 SOURCE CODE: UR/0109/66/011/009/1682/1686

AUTHOR: Chuyko, G. A.; Yakobson, A. M.

41
39
B

ORG: none

TITLE: Principal characteristics of high-lead glass as a material for continuous-dynode secondary-electron multipliers

SOURCE: Radiotekhnika i elektronika, v. 11, no. 9, 1966, 1682-1686

TOPIC TAGS: electron multiplier, lead glass, capillary electron multiplier, secondary electron emission, glass

ABSTRACT: Experiments with a new continuous-dynode multiplier (G. W. Goodrich et al., Rev. Sc. Instr., 1961, 32, 7, 846) which uses conducting films on high-lead glass capillaries (0.6--0.8-mm diameter, 40-mm long) are reported. To build an optimal-parameter multiplier, the knowledge of the following glass characteristics is required (W. Baumgartner et al, Z. angew. Math. und Phys., 1962, 13, 5, 514): (1) Energy spectrum of the secondary electrons emitted by the conducting film and (2) Effect of the angle of incidence and energy of primary electrons on the secondary-emission factor of the conducting film. Measurement of these two characteristics is reported; the measured mean secondary-electron energy was found be 8 v. It was also found that the well-known formulas for the secondary-emission

Card 1/2 UDC:666.112.4:621.383.292

L 46953-66

ACC NR: AP6031033 2

factor are applicable to the case of high-lead glass emission. The experimental bunch of capillaries exhibited a gain of 5×10^5 at a voltage of 3000 v applied to its ends. "In conclusion, the authors wish to thank L. A.Grechanik and Ye. A. Faynberg for lending specimens of high-lead glass for experiments." Orig. art. has: 4 figures, 3 formulas, and 2 tables. [03]

SUB CODE: 09 / SUBM DATE: 16Apr65 / ORIG REF: 010 / OTH REF: 006 / ATD PRESS: 5088

Card 2/2 afs

CHUYKO, I.M. (Dnepropetrovsk)

Determining oxide activity in metallurgical slags. Izv.AN SSSR.Otd. tekh.nauk Met.i topl. no.1:29-36 Ja-F '59.
(Activity coefficients) (Slag)

CHUYKO, I.T.

Car safety dogs for endless rope haulage in inclined galleries.
Trudy MakNII 9 no.2:418-431 '59. (MIRA 12:8)
(Mine haulage--Safety measures)

CHUYKO, I.T.

Car catches used in coal slope mining. Biul.tekh.-ekon.inform. no.8:9-11 '59. (MIRA 13:1)
(Coal mines and mining--Equipment and supplies)

CHUYKO, I. T., CAND TECH SCI, "~~INVESTIGATION~~ Study OF PROBLEMS ~~ON~~ of INCREASING the SAFETY OF RAILROAD TRANSPORTATION ON SLOPING MINES." STALINO, 1961. (MIN OF HIGHER AND SEC SPEC ED UKSSR, DONETS ORDER OF LABOR RED BANNER POLYTECH INST). (KL, 3-61, 222).

BELYY, V.D.; CHUYKO, I.T.

Study of the size and character of loads acting on the couplings of mine freight cars. Trudy MakNII 11.Vop.gor.elektromekh.no.3:214-238 '60. (MIRA 16:5)

(Car couplings)

BELYY, V.D.; CHUYKO, I.T.; BOLDOVSKIY, N.V.; NOS, V.S.

Study of diesel mine locomotives. Trudy MakNII 14. Vop. gor. elektromekh. no.5:249-265 '62. (MIRA 16:6)
(Mine railroads)
(Diesel engine exhaust gases--Analysis)

BELYY, V.D.; CHUYKO, I.T.

Calculation of loads acting on the couplings of mine freight cars. Trudy MakNII 14. Vop. gor. elektromekh. no.5:294-301 '62. (MIRA 16:6)

(Car couplings)

BELYY, V.D.; CHUYKO, I.T.

Explosionproof diesel locomotives for mines. Trudy MakNII 12: Vop. gor. elektromekh. no.4:339-357 '61. (MIRA 16:6)

(Mine railroads—Safety appliances)

BELYY, V.D., doktor tekhn. nauk; CHUYKO, I.T., inzh.

Studying reinforcements of ropes used in inclined workings. Vop. rud. transp. no.5:351-372 '61. (MIRA 16:7)

1. Makeyevskiy nauchno-issledovatel'skiy institut po bezopasnosti rabot v gornoy promyshlennosti.
(Wire rope)

CHUYKO, I.T., inzh.

New types of coupling devices for tail rope haulage. Vop. rud. transp. no.5:373-379 '61. (MIRA 16:7)

1. Makeyevskiy nauchno-issledovatel'skiy institut po bezopasnosti rabot v gornoy promyshlennosti.
(Couplings)

CHUYKO, I.T.

Operating longevity of mine car couplings under loads. Trudy MakNII 14. Vop. gor. elektromekh. no.5:290-293 '62. (MIRA 16:6)
(Car couplings)

CHUYKO, V.T.; CHUYKO, K.G. [Chuyko, K.H.]

Using the semimicromethod in studying qualitative analysis at the Teachers' Institute. Nauk. zap. ChDPI 8:11-14 '56. (MIRA 11:2)
(Microchemistry)
(Cherkassy--Teachers, Training of)

SILINSKIY, P.P., otv.red.; BURTSEV, Ye.G., red.; GAVRILOV, M.K., red.; MALYSHEV, R.P., red.; CHUYKO, K.V., red.; SHOTSKIY, V.P., red.; FRIDMAN, V.G., red.; SOROKINA, T.I., tekhn.red.

[Irkutsk Province; a concise manual of its economy and statistics] Irkutskaia oblast'; kratkii ekonom-statisticheskii sbornik. Irkutskoe knizhnoe izd-vo, 1958. 165 p. (MIRA 12:4)

1. Akademiya nauk SSSR. Vostochno-Sibirskiy filial, Irkutsk. (Irkutsk Province--Statistics)

CHUYKO, K.V., otv.za vypusk; KARAS', V.D., tekhn.red.

[On the development of the productive forces of Irkutsk Province] O razvitii proizvoditel'nykh sil Irkutskoi oblasti. Irkutsk, Irkutskoe knizhnoe izd-vo, 1959. 357 p.
(MIRA 12:12)

(Irkutsk Province--Economic policy)

84686

S/051/60/009/005/007/019
E201/E191

26.2420

AUTHORS: Yeremenko, V.V., and Chuyko, L.I.

TITLE: The Effect of Deformation on the Absorption Spectrum of Cuprous Oxide Crystals at 20 °K

PERIODICAL: Optika i spektroskopiya, 1960, Vol.9, No.5, pp 621-625

TEXT: At low temperatures Cu_2O crystals exhibit two series of converging absorption bands, one of which is green and the other yellow. The origin of these two series is not clear. According to some workers (Ref. 3) the green series is due to a combination of lattice vibrations with transitions from a valence band common to both series. Others suggest that the two series are due to transitions from different valence bands (Refs 7, 8). In order to decide between these two viewpoints, the authors studied the effect of compression and electric fields on the bands of the two series. Cuprous oxide crystals were compressed at 20 °K using a press with transparent plungers (Ref. 9) and a metal cryostat with quartz windows (Ref. 10). To find the effect of uniform electric fields at 20 °K the samples were immersed directly in liquid hydrogen. Absorption spectra were recorded using a Shteynkhel'-type spectrograph with a linear dispersion of 12 Å/mm at 5000 Å.

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S/051/60/009/005/007/019
E201/E191

The Effect of Deformation on the Absorption Spectrum of Cuprous Oxide Crystals at 20 °K

The effect of compression on the absorption bands of the yellow series at 20 °K is shown in Fig. 1. Fig. 2 shows the dependence of the shift of two bands of the green series on the shift of the yellow series due to compression. The yellow series was shifted as one unit, but this was not so in the case of the green series where separate bands were shifted by different amounts (Fig. 2). Constant uniform electric fields produced satellites in the yellow series; in strong fields the yellow bands joined the continuous absorption region moving towards longer wavelengths (Fig. 3a). In the case of the green series electric fields broadened somewhat the bands and caused their gradual merging with continuous absorption (Fig. 3б). The displacement of the yellow series as a whole under uniaxial compression means that its energy gap between valence and conduction bands is affected by pressure. Behaviour of the green series indicates that its Rydberg constant is altered by compression, i.e. the effective electron or hole mass is affected. This evidence favours the hypothesis that the

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E201/E191

The Effect of Deformation on the Absorption Spectrum of Cuprous Oxide Crystals at 20 °K

two series are due to transitions from two different valence bands. Effective carrier masses were found for the two series by assuming that they have a common conduction band and that they are due to optical transitions from separate valence bands to the exciton levels, and by assuming that the upper edges of the two valence bands are separated by a gap represented by 1100 cm^{-1} (the frequency interval between the limits of convergence of the two series).

Acknowledgements are made to A.F. Prikhot'ko and V.L. Broude for their advice.

There are 3 figures and 14 references: 8 Soviet, 3 English, 1 German, 1 French and 1 Japanese.

SUBMITTED: February 23, 1960

Card 3/3

L 6675-65 EWT(m)/EWP(q)/EWP(b) MJW/JD 47

ACCESSION NR: AR4036007 S/0276/64/000/003/B065/B065

SOURCE: Ref. zh. Tekhnol. mashinostr. Sv. t., Abs. 3B327

AUTHOR: Zhmuds'ky*y, O. Z.; Pakchanin, L. M.; Chuyko, L. Kh.

TITLE: The influence of high-temperature carburization on the mechanical properties of steels

CITED SOURCE: Visny*k Ky*yivs'k. un-tu, no. 5, 1962, ser. fiz. ta khimiyi, vy*p. 2, 3-5

TOPIC TAGS: steel, steel heat treatment, steel carburization, steel case hardening, high temperature steel carburization, steel strength

TRANSLATION: The influence of high-temperature carburization on the maximum strength of 10, 15Kh, and 16KhGT steels was studied for temperatures of 900, 1,000, and 1,100 degrees. High-temperature carburization in the above temperature range does not lower the maximum strength.

SUB CODE: MM ENCL: 00

Card 1/1

ACC NR: AP7000910 SOURCE CODE: UR/0138/66/000/012/0006/0008

AUTHOR: Yurzhenko, T. I.; Chuyko, L. S.; Kirichek, A. A.; Blokh, G. A.

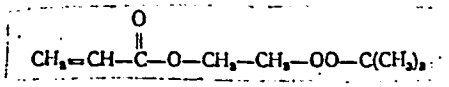
ORG: L'vov Polytechnic Institute (L'vovskiy politekhnicheskiy institut)

TITLE: Synthesis of peroxidated rubbers and nonsulfur vulcanization of these rubbers

SOURCE: Kauchuk i rezina, no. 12, 1966, 6-8

TOPIC TAGS: peroxidated rubber, peroxide, monomer, butadiene, styrene, peroxidated rubber vulcanization, peroxidated rubber vulcanisate, nonsulfur vulcanization

ABSTRACT: A study has been made of the nonsulfur vulcanization of rubbers involving preliminary introduction of side peroxide groups in the elastomer backbone. The peroxide-group-containing ("peroxidated") rubbers were synthesized by emulsion copolymerization of butadiene, styrene, and tert-butyl 2-acrylatoethyl peroxide (AP)

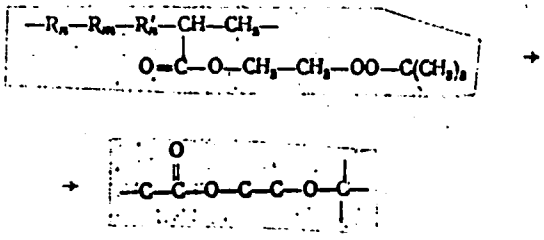


The percentages of the monomers were: butadiene, 67.5—73.0%; styrene, 25%; AP, 2.0—7.5%. The copolymerization procedure is described in the source. The rubber mixtures were prepared at 50C on mills using standard recipes for butadiene-styrene

Card 1/2 UDC: 678.760.2-139.004.12

ACC NR: AP7000910

rubbers. Vulcanizates with the best properties were obtained from peroxidated rubber containing 3.5% AP, and vulcanized at 140C for 30 min (tensile strength, 203 kg/cm^2; elongation, 543%; residual elongation, 15%). The high vulcanizing effectiveness of peroxide groups, preliminarily introduced in the rubber, is due to their attachment to and regular distribution in the macromolecules:



The proposed nonsulfur vulcanization method makes it possible: 1) to control the distribution and concentration of crosslinks; and 2) to control the length and type of the crosslinks by using different peroxide monomers. Orig. art. has: 1 figure and 2 tables.

[BO]

SUB CODE: 11, 07/ SUBM DATE: 09Sep65/ ORIG REF: 004/ ATD PRESS: 5109

Card 2/2

USSR / Cultivated Plants. Plants for Technical Use. M
Oil Plants. Sugar Plants.

Abs Jour : Ref Zhur - Biologiya, No 6, 1959, No. 25016

Author : Chuyko, M. I.
Inst : Nizhne-Tagil' State Pedagogical Institute
Title : Some Experiments on Growing the White Mulberry (Morus alba Linn.)

Orig Pub : Uch. zap. Nizhne-Tagil'sk gos. ped. in-ta, 1957, 1, No 1, 245-256

Abstract : On the scientific-experimental plot of Novozybkov Pedagogical Institute of the Bryanskaya Oblast' in the spring of 1954, experiments on growing the white mulberry, with irrigation and without irrigation, were established. Seeds for the experiment were taken from Armenia, from the Stavropol'skiy

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USSR / Cultivated Plants. Plants for Technical Use. M
Oil Plants. Sugar Plants.

Abs Jour : Ref Zhur - Biologiya, No 6, 1959, No. 25016

Kray and from Tsarichansk. Under the conditions of Novozybkov Rayon, the white mulberry developed better from the seeds obtained in Armenia. Best germination of the seeds took place after soaking them in water for 2 days prior to sowing. One-year plants, wintering in ground, developed better than those dug in and transplanted, thereby explaining the preservation of unpruned roots. Seedlings, which did not attain the height of 15 cm, endured the winter badly. The average survival capacity of the plants for the winter period of 1948-1949 was not more than 50%. Plants of older age developed well and produced an abundant weight gain

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USSR / Cultivated Plants. Plants for Technical Use. M
Oil Plants. Sugar Plants.

Abs Jour : Ref Zhur - Biologiya, No 6, 1959, No. 25016

of the green mass. A deduction concerning the cultivation feasibility of the white mulberry, under the conditions of Bryanskaya Oblast', is being considered. -- M. P. Zlotin

Card 3/3

CHUYKO, M.I., kand.pedagog.nauk

Device for demonstrating parts of microscopic preparations.
Biol. v shkole no. 6:76-77 N-D '60. (MIRA 14:1)

1. Nizhne-Tagil'skiy pedagogicheskiy institut.
(Microscope--Technique)

CHUYKO, N.

Light-duty jack for lifting streetcars back on the tracks. Zhil.-kom. khoz. 10 no.10:25-27 '60. (MIRA 13:10)

1. Glavnyy inzh. Vladivostokskogo tramvaynogo upravleniya, g.Vladivostok.

(Streetcars--Maintenance and repair)
(Lifting-jacks)

CHUYKO, N.

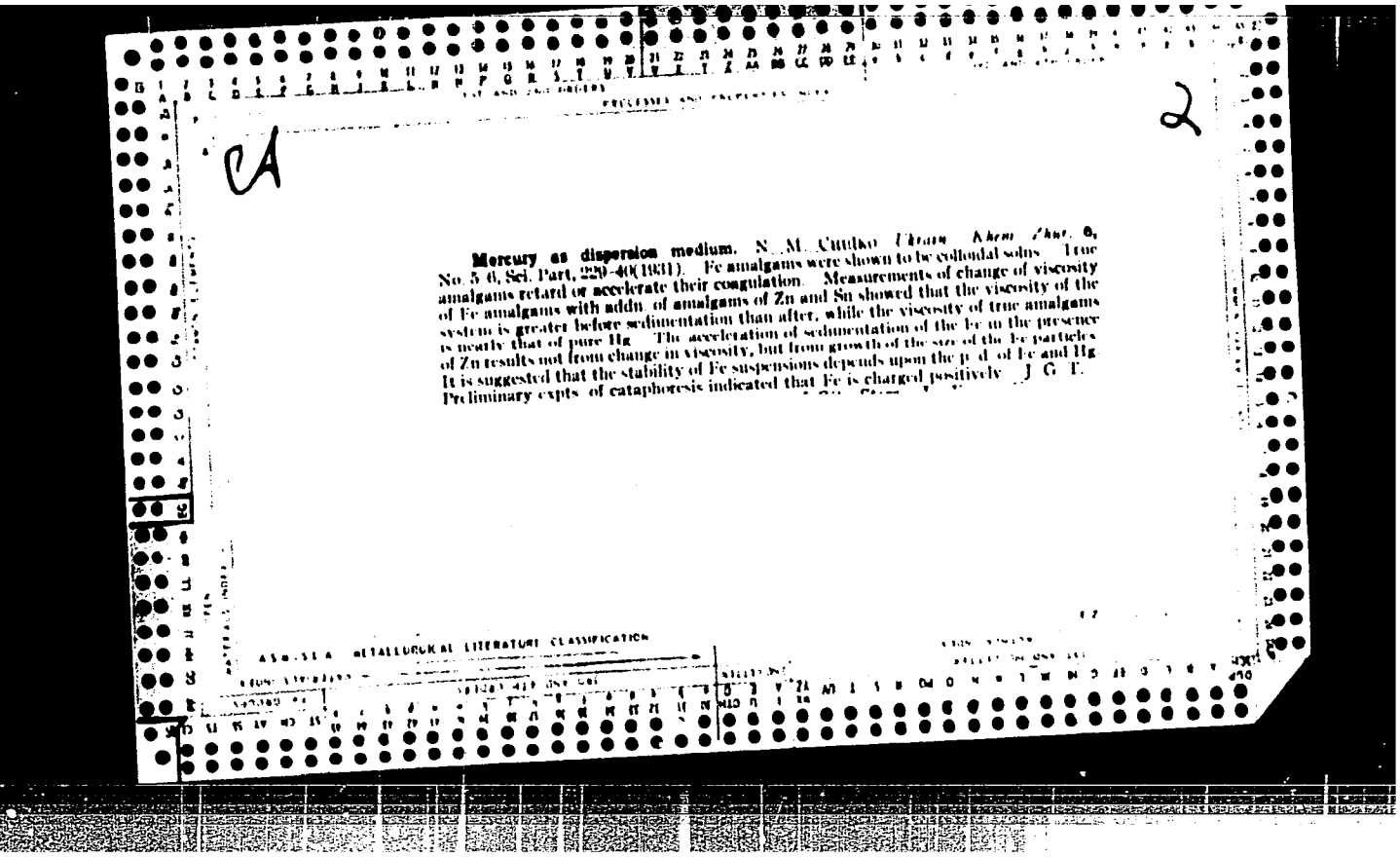
An expensive and unnecessary parallelism. Fin. SSSR 22 no.11: 48-49 N '61. (MIRA 14:11)

1. Rabotnik Gor'kovskogo sovnarkhoza.
(Gorkiy Province--Industrial procurement--Accounting)

CHUYKO, N.M.

Opening of buds in winter. Priroda 51 no.1:126 Ja '62.
(MIRA 15:1)

1. Nizhnetagil'skiy pedagogicheskiy institut.
(Ural Mountain region--Plants, Flowering of)

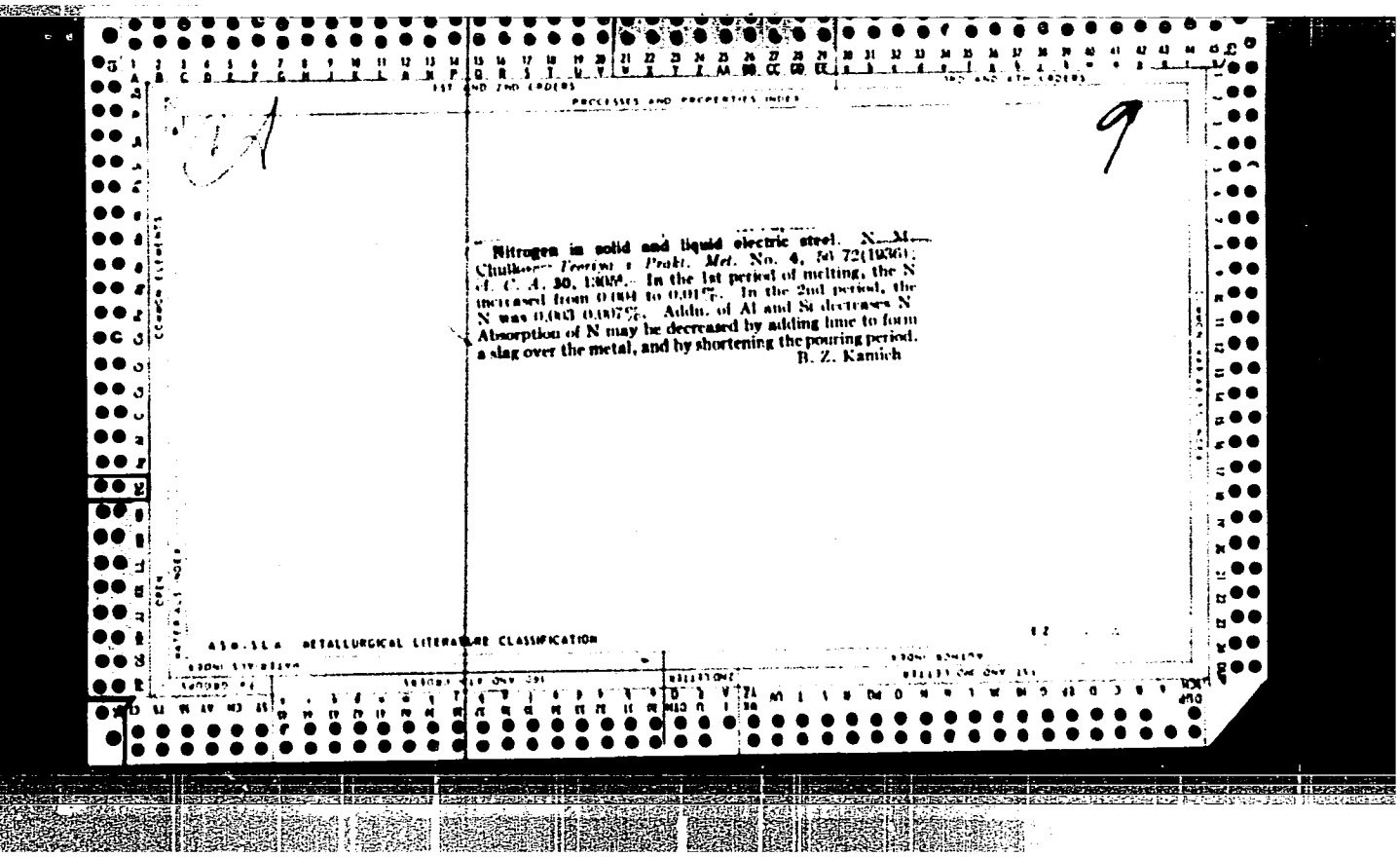


CA

2

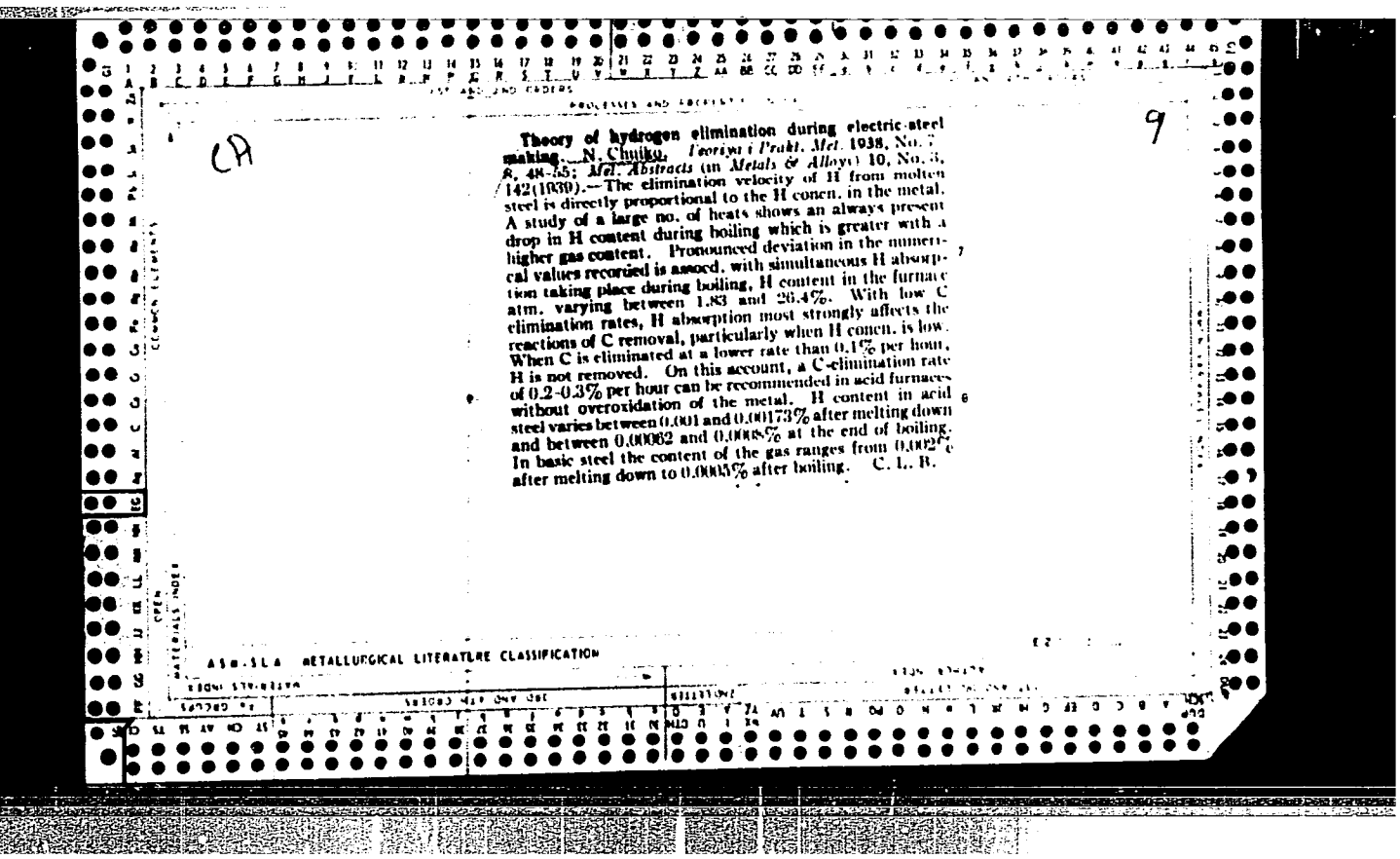
Mercury as dispersion medium. N. M. Cuttko *Trans. Akem. Inst.* 6, No. 5-6, Sci. Part, 229-40(1931). Fe amalgams were shown to be colloidal solns. True amalgams retard or accelerate their coagulation. Measurements of change of viscosity of Fe amalgams with addn. of amalgams of Zn and Sn showed that the viscosity of the system is greater before sedimentation than after, while the viscosity of true amalgams is nearly that of pure Hg. The acceleration of sedimentation of the Fe in the presence of Zn results not from change in viscosity, but from growth of the size of the Fe particles. It is suggested that the stability of Fe suspensions depends upon the p. d. of Fe and Hg. Preliminary expts. of cataphoresis indicated that Fe is charged positively. J. G. F.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION



Nitrogen in solid and liquid electric steel. N. M. Chulkov. *Tsvetnye Metally i Prakt. Met.* No. 4, 50 72(1936); cf. C. A. 30, 1305⁹. In the 1st period of melting, the N increased from 0.004 to 0.011%. In the 2nd period, the N was 0.003–0.007%. Addn. of Al and Si decreases N. Absorption of N may be decreased by adding lime to form a slag over the metal, and by shortening the pouring period.
B. Z. Kamich

A10-11A METALLURGICAL LITERATURE CLASSIFICATION

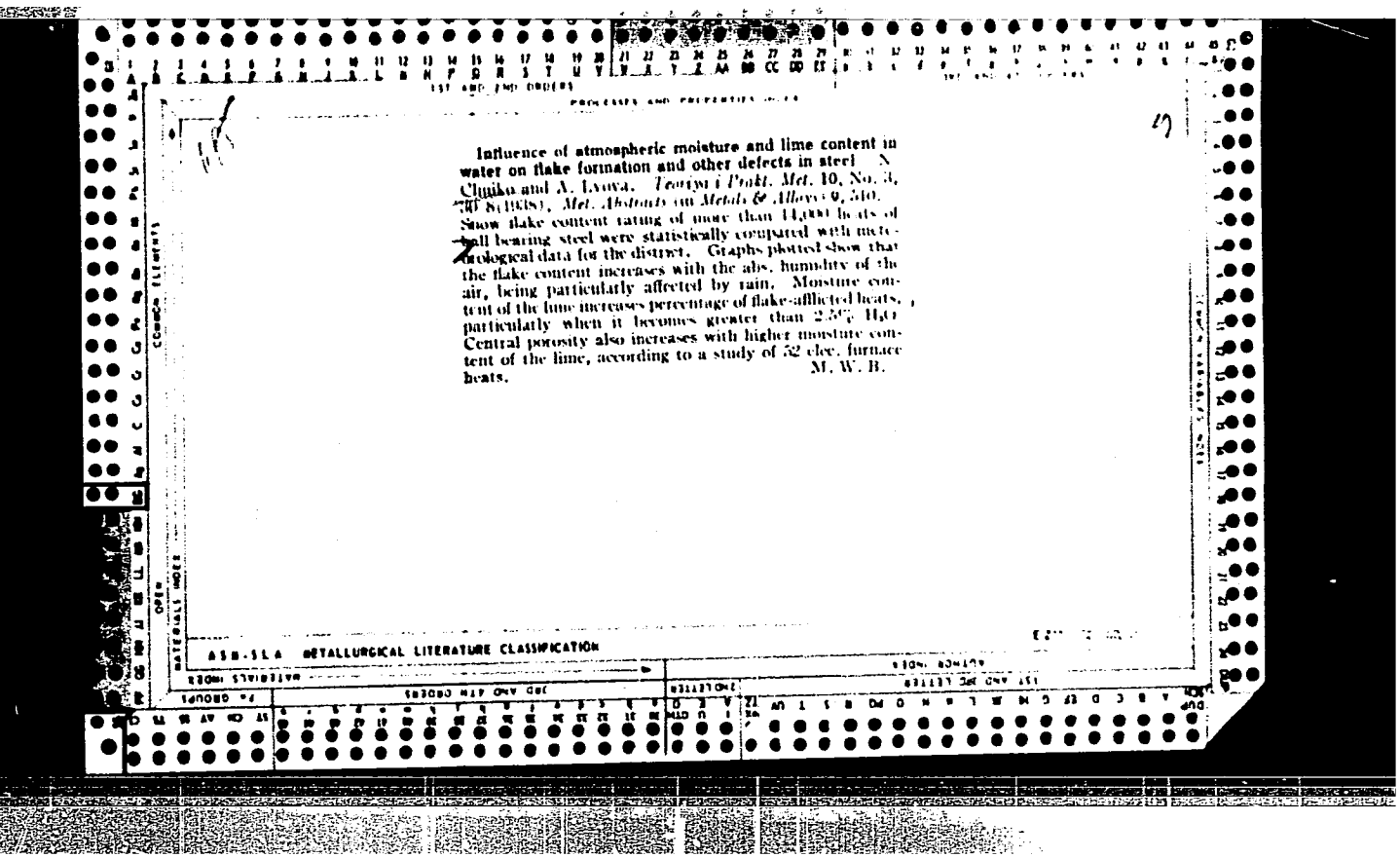


CA

9

Theory of hydrogen elimination during electric-steel making. N. Chuiko. *Teoriya i Prakt. Met.* 1938, No. 7-8, 48-55; *Met. Abstracts* (in *Metals & Alloys*) 10, No. 3, 142(1939).—The elimination velocity of H from molten steel is directly proportional to the H concn. in the metal. A study of a large no. of heats shows an always present drop in H content during boiling which is greater with a higher gas content. Pronounced deviation in the numerical values recorded is assocd. with simultaneous H absorption taking place during boiling, H content in the furnace atm. varying between 1.83 and 26.4%. With low C elimination rates, H absorption most strongly affects the reactions of C removal, particularly when H concn. is low. When C is eliminated at a lower rate than 0.1% per hour, H is not removed. On this account, a C-elimination rate of 0.2-0.3% per hour can be recommended in acid furnaces without overoxidation of the metal. H content in acid steel varies between 0.001 and 0.00173% after melting down and between 0.00062 and 0.0008% at the end of boiling. In basic steel the content of the gas ranges from 0.002% after melting down to 0.0005% after boiling. C. L. R.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

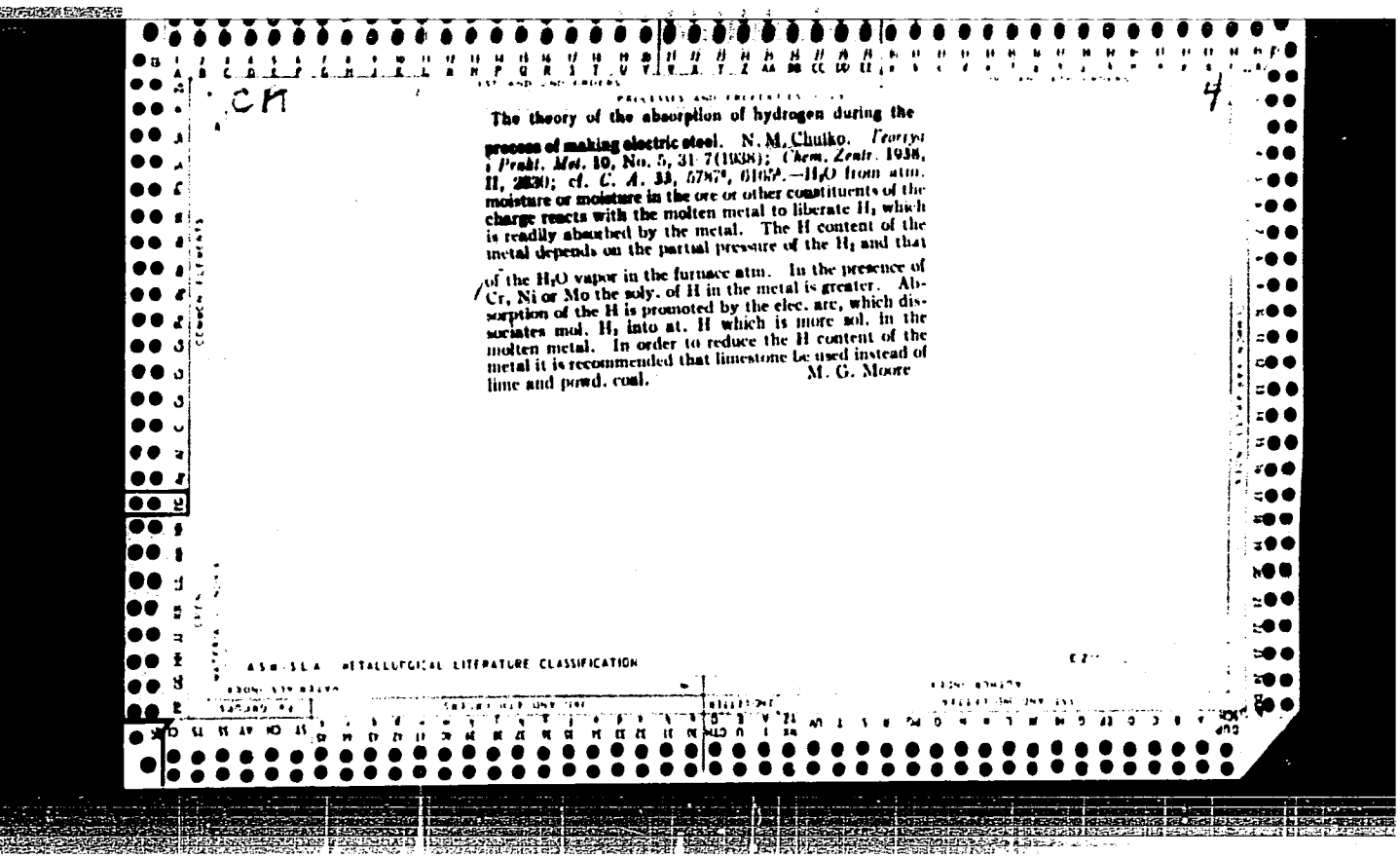


Influence of atmospheric moisture and lime content in water on flake formation and other defects in steel N. Chuiko and A. Lvova. *Tsvetn i Prokt. Met.* 10, No. 3, 37-8(1938). *Met. Abstracts on Metals & Alloys* 6, 340.

Snow flake content rating of more than 11,000 heats of ball bearing steel were statistically compared with meteorological data for the district. Graphs plotted show that the flake content increases with the abs. humidity of the air, being particularly affected by rain. Moisture content of the lime increases percentage of flake-afflicted heats, particularly when it becomes greater than 2.5% H_2O. Central porosity also increases with higher moisture content of the lime, according to a study of 52 elec. furnace heats.

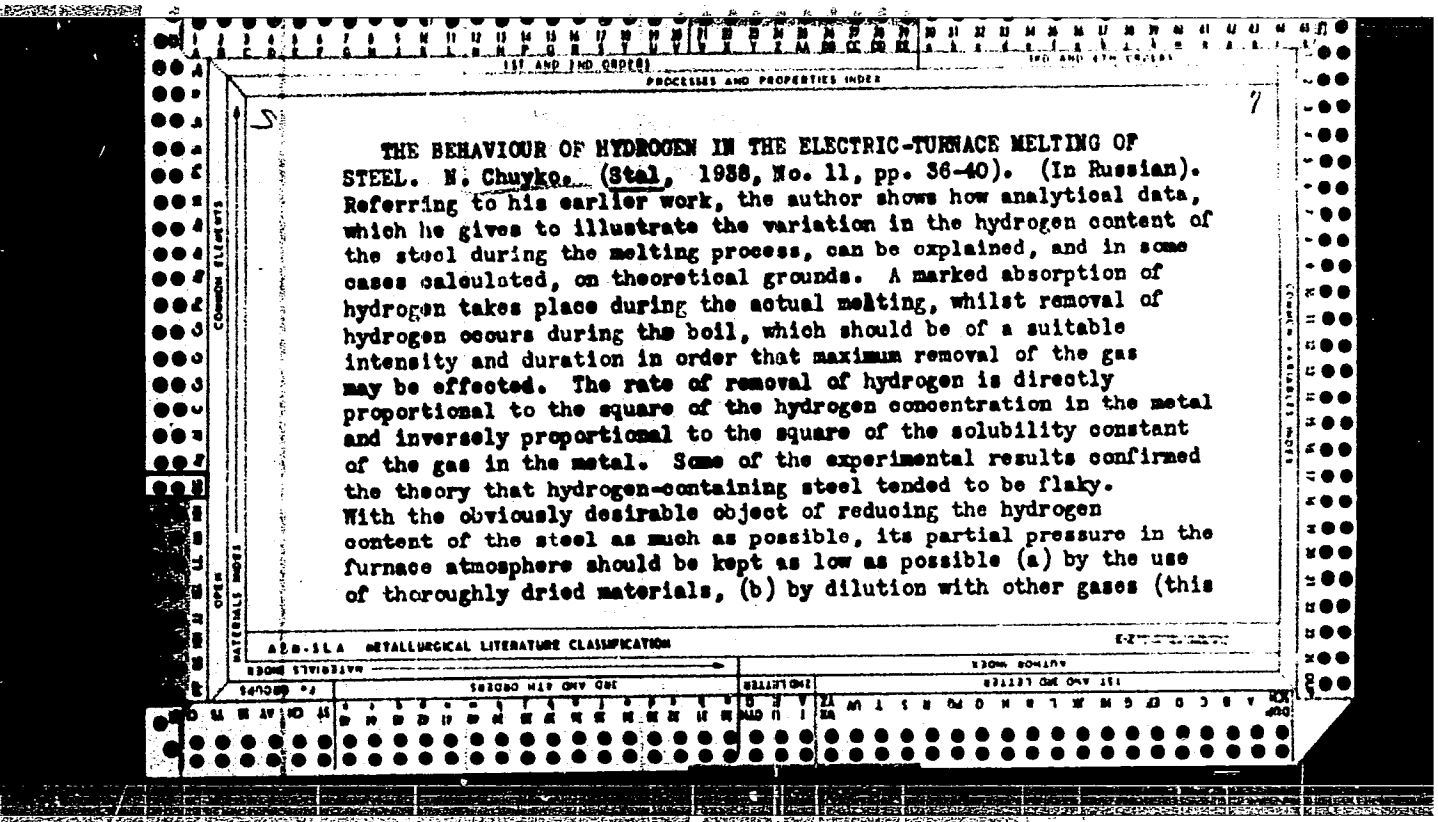
M. W. B.

ASB-SLA METALLURGICAL LITERATURE CLASSIFICATION



The theory of the absorption of hydrogen during the process of making electric steel. N. M. Chuiko. *Teoriya i Prakt. Met.* 10, No. 5, 31-7(1938); *Chem. Zentr.* 1938, II, 2830; *cf. C. A.* 33, 5787⁸, 6105⁸.—H_2O from atm. moisture or moisture in the ore or other constituents of the charge reacts with the molten metal to liberate H_2 which is readily absorbed by the metal. The H content of the metal depends on the partial pressure of the H_2 and that of the H_2O vapor in the furnace atm. In the presence of Cr, Ni or Mo the soly. of H in the metal is greater. Absorption of the H is promoted by the elec. arc, which dissociates mol. H_2 into at. H which is more sol. in the molten metal. In order to reduce the H content of the metal it is recommended that limestone be used instead of lime and powd. coal.

M. G. Moore



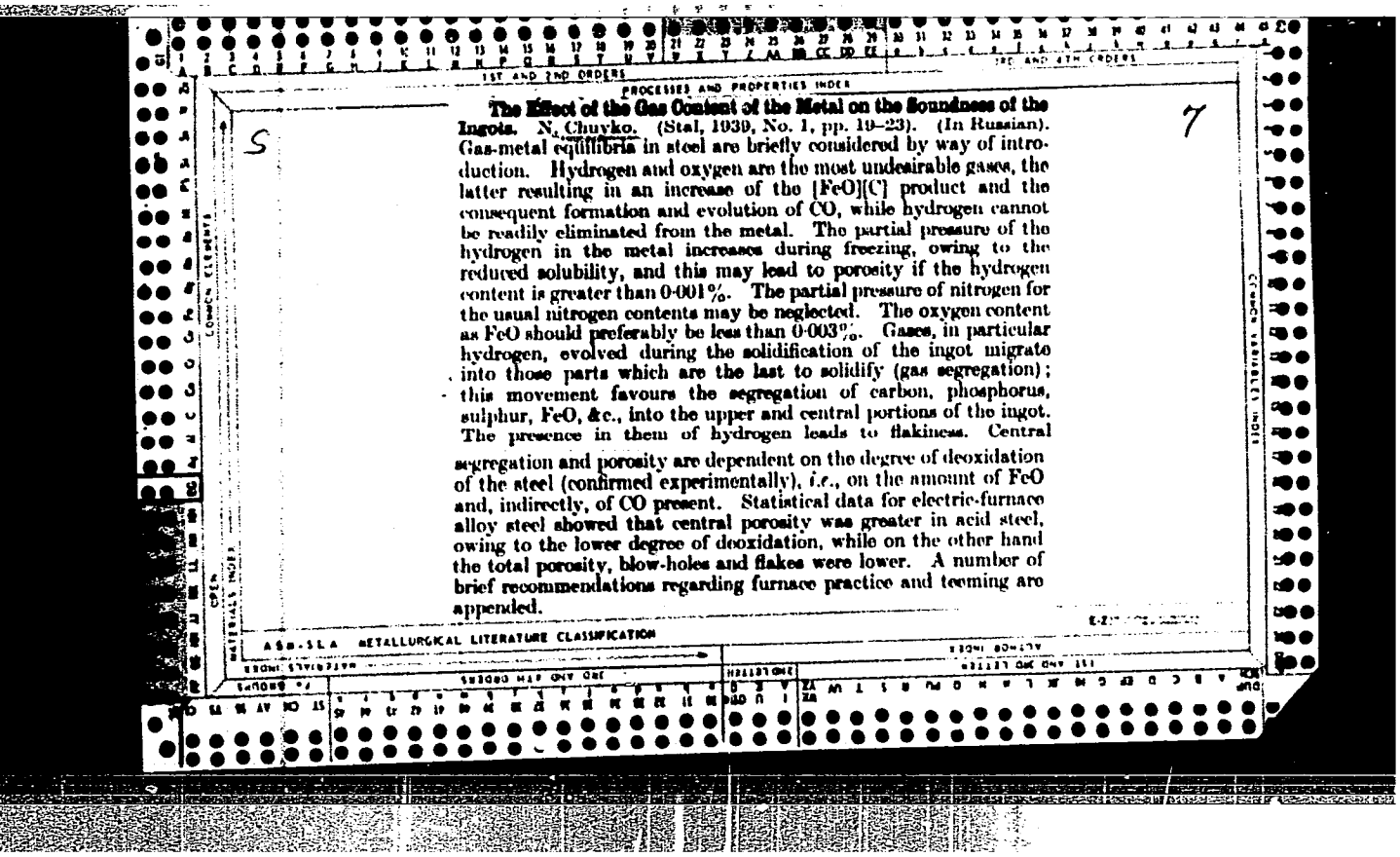
PROCESSES AND PROPERTIES INDEX

7

THE BEHAVIOUR OF HYDROGEN IN THE ELECTRIC-FURNACE MELTING OF STEEL. N. Chuyko. (Stal, 1938, No. 11, pp. 36-40). (In Russian). Referring to his earlier work, the author shows how analytical data, which he gives to illustrate the variation in the hydrogen content of the steel during the melting process, can be explained, and in some cases calculated, on theoretical grounds. A marked absorption of hydrogen takes place during the actual melting, whilst removal of hydrogen occurs during the boil, which should be of a suitable intensity and duration in order that maximum removal of the gas may be effected. The rate of removal of hydrogen is directly proportional to the square of the hydrogen concentration in the metal and inversely proportional to the square of the solubility constant of the gas in the metal. Some of the experimental results confirmed the theory that hydrogen-containing steel tended to be flaky. With the obviously desirable object of reducing the hydrogen content of the steel as much as possible, its partial pressure in the furnace atmosphere should be kept as low as possible (a) by the use of thoroughly dried materials, (b) by dilution with other gases (this

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

can be achieved by the addition of limestone in electric-furnace melting), and (c) by the use of fuel with a low hydrogen content, e.g. coal or coke dust in the open-hearth process.



1ST AND 2ND ORDERS

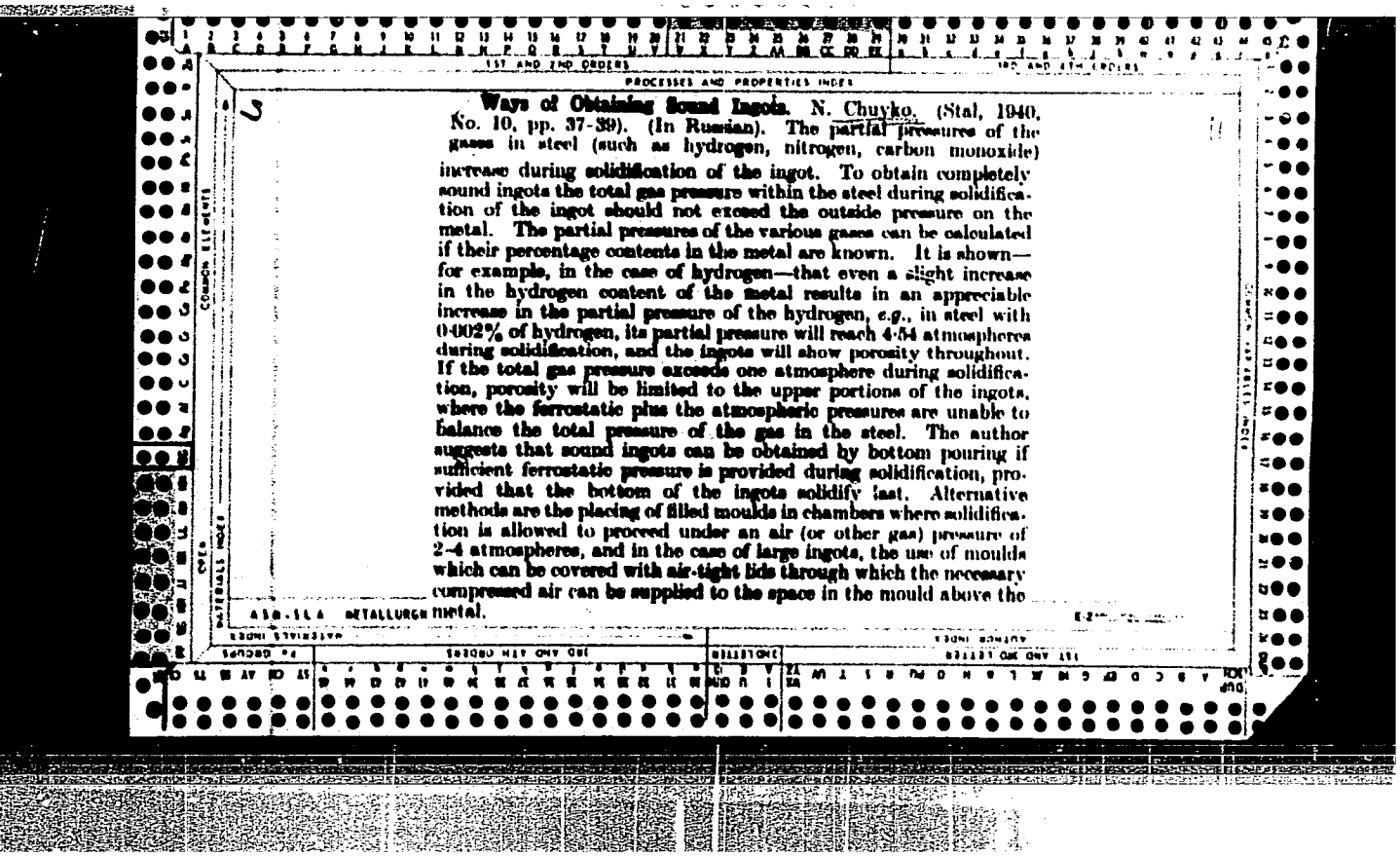
PROCESSES AND PROPERTIES INDEX

S

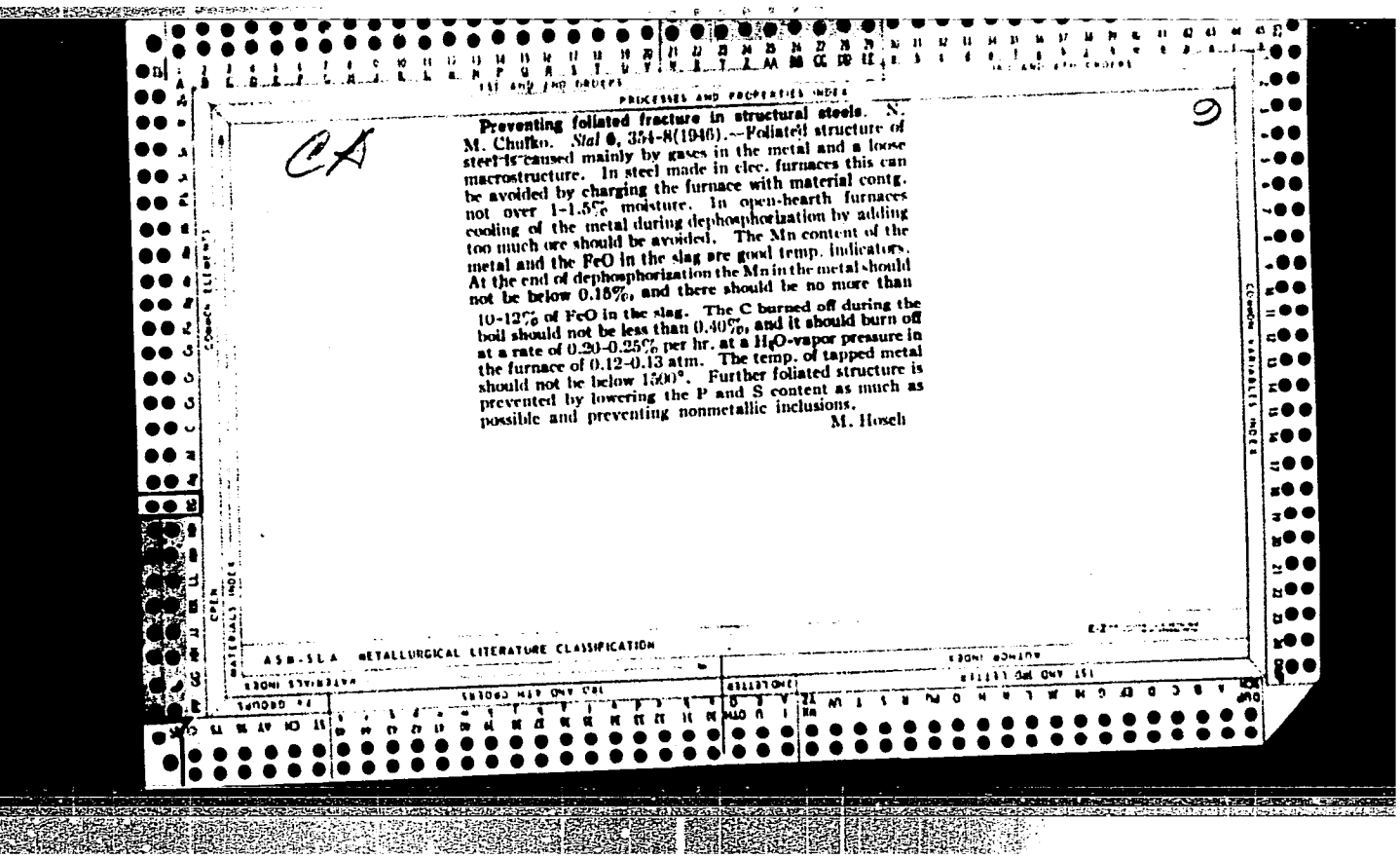
7

The Effect of the Gas Content of the Metal on the Soundness of the Ingots. N. Chuyko. (Stal, 1939, No. 1, pp. 19–23). (In Russian). Gas-metal equilibria in steel are briefly considered by way of introduction. Hydrogen and oxygen are the most undesirable gases, the latter resulting in an increase of the [FeO][C] product and the consequent formation and evolution of CO, while hydrogen cannot be readily eliminated from the metal. The partial pressure of the hydrogen in the metal increases during freezing, owing to the reduced solubility, and this may lead to porosity if the hydrogen content is greater than 0·001%. The partial pressure of nitrogen for the usual nitrogen contents may be neglected. The oxygen content as FeO should preferably be less than 0·003%. Gases, in particular hydrogen, evolved during the solidification of the ingot migrate into those parts which are the last to solidify (gas segregation); this movement favours the segregation of carbon, phosphorus, sulphur, FeO, &c., into the upper and central portions of the ingot. The presence in them of hydrogen leads to flakiness. Central segregation and porosity are dependent on the degree of deoxidation of the steel (confirmed experimentally), *i.e.*, on the amount of FeO and, indirectly, of CO present. Statistical data for electric-furnace alloy steel showed that central porosity was greater in acid steel, owing to the lower degree of deoxidation, while on the other hand the total porosity, blow-holes and flakes were lower. A number of brief recommendations regarding furnace practice and teeming are appended.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

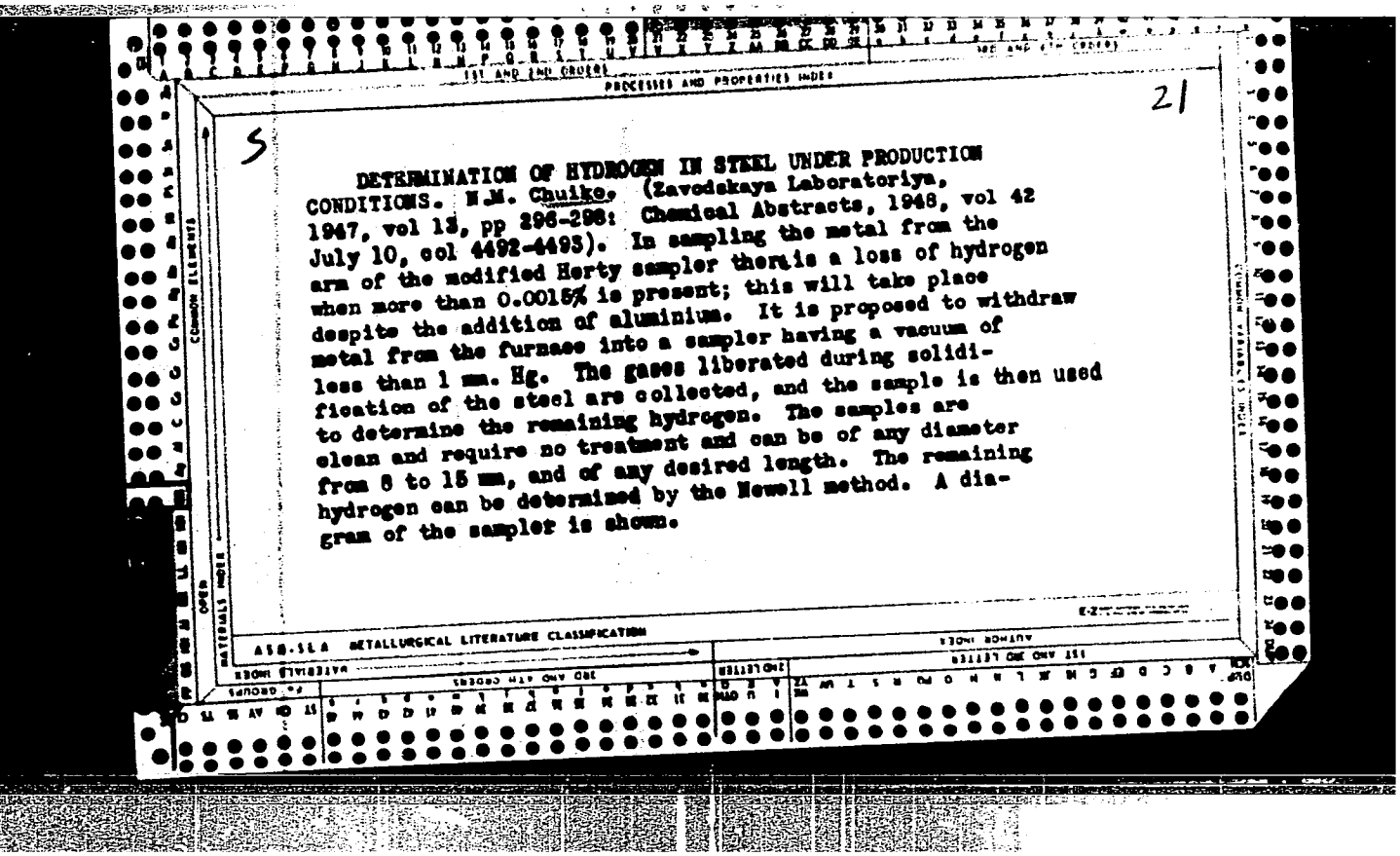


Ways of Obtaining Sound Ingots. N. Chuyko. (Stal, 1940, No. 10, pp. 37-39). (In Russian). The partial pressures of the gases in steel (such as hydrogen, nitrogen, carbon monoxide) increase during solidification of the ingot. To obtain completely sound ingots the total gas pressure within the steel during solidification of the ingot should not exceed the outside pressure on the metal. The partial pressures of the various gases can be calculated if their percentage contents in the metal are known. It is shown—for example, in the case of hydrogen—that even a slight increase in the hydrogen content of the metal results in an appreciable increase in the partial pressure of the hydrogen, *e.g.*, in steel with 0·002% of hydrogen, its partial pressure will reach 4·54 atmospheres during solidification, and the ingots will show porosity throughout. If the total gas pressure exceeds one atmosphere during solidification, porosity will be limited to the upper portions of the ingots, where the ferrostatic plus the atmospheric pressures are unable to balance the total pressure of the gas in the steel. The author suggests that sound ingots can be obtained by bottom pouring if sufficient ferrostatic pressure is provided during solidification, provided that the bottom of the ingots solidify last. Alternative methods are the placing of filled moulds in chambers where solidification is allowed to proceed under an air (or other gas) pressure of 2–4 atmospheres, and in the case of large ingots, the use of moulds which can be covered with air-tight lids through which the necessary compressed air can be supplied to the space in the mould above the metal.



Preventing foliated fracture in structural steels. S. M. Chufko. *Stal* **6**, 354-8(1946).—Foliated structure of steel is caused mainly by gases in the metal and a loose macrostructure. In steel made in elec. furnaces this can be avoided by charging the furnace with material contg. not over 1–1.5% moisture. In open-hearth furnaces cooling of the metal during dephosphorization by adding too much ore should be avoided. The Mn content of the metal and the FeO in the slag are good temp. indicators. At the end of dephosphorization the Mn in the metal should not be below 0.18%, and there should be no more than 10–12% of FeO in the slag. The C burned off during the boil should not be less than 0.40%, and it should burn off at a rate of 0.20–0.25% per hr. at a H_2O-vapor pressure in the furnace of 0.12–0.13 atm. The temp. of tapped metal should not be below 1500°. Further foliated structure is prevented by lowering the P and S content as much as possible and preventing nonmetallic inclusions.

M. Hoseh



S

21

DETERMINATION OF HYDROGEN IN STEEL UNDER PRODUCTION CONDITIONS. N.M. Chuiko. (Zavodskaya Laboratoriya, 1947, vol 13, pp 296-298: Chemical Abstracts, 1948, vol 42 July 10, col 4492-4493). In sampling the metal from the arm of the modified Herty sampler there is a loss of hydrogen when more than 0.0015% is present; this will take place despite the addition of aluminium. It is proposed to withdraw metal from the furnace into a sampler having a vacuum of less than 1 mm. Hg. The gases liberated during solidification of the steel are collected, and the sample is then used to determine the remaining hydrogen. The samples are clean and require no treatment and can be of any diameter from 8 to 15 mm, and of any desired length. The remaining hydrogen can be determined by the Newell method. A diagram of the sampler is shown.

CA

9

Effect of ferrous oxide in slag on the quality of structural steel. N. M. Chuiko. *Stal* **8**, 691–8(1948); cf. *C.A.* **41**, 2881h.—The FeO content of the slag was detd. after the scrap melted, prior to running off the slag, prior to adding FeCr, and prior to tapping the heat. Specimens from heats were tested for oxide and sulfide contents, impact brittleness, and percentage reduction in area. The oxidizing period of a run had a telling effect on the contamination of the steel by oxides and sulfides as well as on the impact brittleness and percentage reduction in area. With an increase in the FeO in the slag prior to its running off, the steel improved with respect to contaminants and elastic properties. The most favorable conditions for the oxidizing period were: burning off of 0.25–0.40% of C at an av. rate of $\leq 0.45\%$ per hr. and a max. rate of $\leq 0.8\%$ per hr., the Mn content prior to drawing off the slag should not exceed 0.1%, and the FeO should not be below 16–18%, and preferably be 20–25%. The duration of the oxidizing period in a 30-ton elec. furnace should be 40–60 min. The oxidizing should be carried out thoroughly in order that finely dispersed SiO_2 and Al_2O_3 be slagged by FeO. In the reducing process the metal should be thoroughly deoxidized, first by adding FeMn in a quantity corresponding to the lower limit of Mn in the steel. The slag is deoxidized first with a carbonaceous material, e.g., coke or C black, and then with a mixt. of C, FeSi, and CaO taken in such quantities that the Si in the steel be 0.15–0.18% and the FeO in the slag (before addn. of FeCr) be 0.5–1.0%.

M. Hoseh

CHUYKO, N. M.

CHUYKO, N. M. - "Distribution of Oxygen and Hydrogen between Metal, Slag, and the Gas Phase in the Process of Steel Smelting." Acad Sci USSR, Inst. Metallurgy imeni A. A. Baykov, Moscow-Dnepropetrovsk, 1955
(Dissertation for the Degree of Doctor of Technical Sciences)

SO: Knizhnaya Letopis', No. 33, 1955, pp 85-87

Name: CHUYKO, Nikolay Markovich

Dissertation: Distribution of Oxygen and Hydrogen among the Metal, Slag, and Gaseous Phase in the Process of Smelting Steel

Degree: Doc Tech Sci

Affiliation: Dnepropetrovsk Metallurgical Inst

Defense Date, Place: 8 Mar 56, Council of Inst of Metallurgy imeni Baykov, Acad Sci USSR

Certification Date: 27 Oct 56

Source: BMVO 6/57

137-58-4-6670

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 4, p 51 (USSR)

AUTHOR: Chuyko, N. M.

TITLE: Absorption and Elimination of Hydrogen During the Smelting of Steel in Open-hearth and Electric Furnaces (Pogloshcheniye i udaleniye vodoroda v protsesse plavki stali v martenovskikh i elektricheskikh pechakh)

PERIODICAL: V sb.: Fiz.-khim. osnovy proiz-va stali. Moscow, AN SSSR, 1957, pp 540-552. Diskus. pp 650-655

ABSTRACT: The effect of various elements on the solubility of H in steel is shown, and a mathematical expression for the ratio of the solubility of H in metal (M) to the concentrations of elements forming interstitial solutions (C, S, P, and others) and to [O] is given. It is assumed that H in slag (Sl) is in the form of hydrides and hydroxyl ions, while only hydroxyl ions form in the solution of water vapors. The rate of absorption of H by M depends upon the transport of the H through the Sl. To permit solution of practical problems, the following equation is suggested: $v''_H = D'_H \Delta[H] = D'_H([H_p] - [H])$, where $D'_H = D_H \cdot h_H \cdot F/d \cdot Q$ min^{-1} (in a 185-t furnace $D'_H = 0.0226\ min^{-1}$; while for a 30-t

Card 1/2

Absorption and Elimination of (cont.)

electric furnace $D'_H=0.047\ min^{-1}$, D_H is the coefficient of diffusion of H in Sl, F is the area of contact between M and Sl, Q is the weight of the M, d is the thickness of the Sl layer, $[H_p]$ is the equilibrium concentration of H in M, corresponding to the partial pressure of H_2 and H_2O in the furnace atmosphere; $h_H=(\Sigma H)/[H]$. The rate of elimination of H when the M boils is related to the rate of carbon burn-out by the equation: $v'_H=v_C\cdot [H]^2/6k^2_H\cdot p_{CO}$, a similar relation being observed to hold when the metals are blown by the gases. The relation between the amount of H eliminated and the amount of gas liberated or blown is: $V_{gas}=112P\cdot k^2_H\cdot(1\%[H]-1\%[H]_{initial})m^3/t$, where P is the sum of the partial pressures of the H and of the gas in the M. The overall rate of elimination of H from the M depends upon v'_H and v''_H ($v_H=v'_H-v''_H$). Knowing v_H it is possible to determine the amount of H eliminated in small periods of time on the basis of a given v_C, by employing the equations $\Delta[H]\%=v_H\cdot\Delta t$ and $\Delta[C]\%=v_C\cdot\Delta t$. It follows from the calculations that at a low H_2O partial pressure in the furnace, a 30-40 min. boil is adequate. If the p_{H_2O} is high, a long boil for the purpose of degasifiying the metal is useless. To obtain a M with a low [H] it is necessary to have a low p_{H_2O} and p_{H_2} in the gas phase. Bibliography: 18 references.

Card 2/2 S.S.

1. Steel--Smelting 2. Hydrogen--Absorption 3. Hydrogen--Solubility--Mathematical analysis

66502

SOV/137-59-7-14586

18.3200

Translation from: Referativnyy zhurnal. Metallurgiya, 1959, Nr 7, p 54 (USSR)

AUTHORS: Chuyko, N.M., Kadinov, Ye., Rutkovskiy V., Zabaluyev, I., Bobkov, T., Kurganov, V., Antipenko, G.

TITLE: New Technology in Electric Smelting of Ball Bearing Steel

PERIODICAL: Tekhn.-ekon. byul. Sovnarkhoz Zaporozhsk. ekon. adm. r-na, 1958, Nr 1, pp 6-10

ABSTRACT: A new method of ball-bearing steel smelting in high-capacity (50 t) arc furnaces was developed at the "Dneprospetsstal'" Plant. The amount of burnt-out C during the oxidation stage must be $\leq$0.25%; the temperature of the metal prior to slag skimming must be about the same as the temperature of teeming (1,550°-1,570°C) as measured by the plunged thermocouple. Reduction takes place under white slag. Preliminary deoxidation of the slag is performed by carbonization of the metal by 0.03-0.05% C with the use of dry ground coke. Fe-Cr and Fe-Si are added until the slag is being formed. The slag is formed through lime, refractory clay and fluorspar in a 6:2:1 proportion and amounting to 3-4% of the metal weight. Deoxidation is carried out by 3-4 blends of ground coke, 75% Fe-Si powder, and lime. 0.5 kg/t aluminum powder is added to the

Card 1/2

New Technology in Electric Smelting of Ball Bearing Steel SOV/137-59-7-14586

final mixture 10 minutes prior to teeming. The slag, before removing, contains CaO $>55.0\%$; $CaC_2 \leq 0.5\%$ and $FeO \leq 0.4\%$. The metal temperature is 1,545-1,565°C. 0.5 kg/t is added by using a bar fixed at the ladle rim. In teeming process, first, most of the slag and then the metal with the slag are removed. Refining extends over 1 hour 30 minutes. Contamination of the steel by non-metallic impurities does not increase: the average mark for oxides (October 1957) is 2.15 by conventional technology and 2.12 by the new method: it is respectively 2.17 and 2.15 for sulfides. Globular impurities usually do not occur in the new technology. Duration of the smelting time is reduced by 10%; electric power consumption is reduced by 50-70 kw-hrs/ton.

V.B.

Card 2/2

SOV/24-58-11-7/42

AUTHOR: Chuyko, N. M. (Dnepropetrovsk)

TITLE: Determination of the Active Concentration of Slag Components Taking into Consideration the Existence of Ions and of Non-dissociated Compounds (Opredeleniye aktivnykh kontsentratsiy komponentov shlaka pri uchete sushchestvovaniya ionov i nedissotsiirovannykh soyedineniy)

PERIODICAL: Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk, 1958, Nr 11, pp 7-14 (USSR)

ABSTRACT: At present two theories exist on the structure of slags: the molecular and the ionic. According to the molecular theory all the oxides and other chemical compounds are in the form of individual molecules or groups which are not dissociated into ions. According to the ionic theory all the chemical compounds in the liquid slag are completely decomposed into ions (Refs 1-9). These two theories are completely contradictory and neither of them is entirely in agreement with practical data and they do not permit determining the real concentrations of the slag components without using "activity coefficients". An up-to-date slag theory should be a general one, taking

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Determination of the Active Concentration of Slag Components Taking into Consideration the Existence of Ions and of Non-dissociated Compounds

into consideration the presence in the slags, of compounds with various chemical bonds and should include as particular cases both the older molecular theory and the more recent ionic theory. The degree of dissociation of chemical compounds into ions can qualitatively be determined from cryoscope data. M. Rolin (Ref 7) has shown that the oxides SiO_2 and TiO_2 in cryolite do not dissociate into ions and do not become ionised. These data are extremely valuable since they indicate that silica may be present in diluted slag solutions in the form of individual molecules. The character of the chemical bond of the compounds can also be judged from the change in the reaction heat as a function of the sum of the radii of the cathions and the anions. Evaluation of experimental data has shown that for ionic bonds the change of the thermodynamic potential and of the thermal effect of the reaction decreases with increasing value of the radii of the cathion and the anion. In the case of covalent and also in the case of mixed bonds, an

Determination of the Active Concentration of Slag Components Taking into Consideration the Existence of Ions and of Non-dissociated Compounds

inverse dependence is obtained of the changes of these values on the sum of the radii of the cathion and the anion. Thus, for instance, for oxides of elements of the third periodic group a decrease in the cathion radius on changing over from sodium to magnesium will bring about an increase in the reaction heat (ionic bond) and then the specific reaction heat will drop (covalent bond) for the oxides Al_2O_3, SiO_2 and P_2O_5. This and other data indicate that covalent bonds manifest themselves strongly in oxides on transition from alkali earth metals to elements of the third and fourth groups. Available cryoscope, electric conductivity and heat of formation data of various compounds allow the conclusion that the oxides of alkali and alkali earth metals have ionic bonds between atoms of the metal and the oxygen and during fusion they dissociate into metal cathions and oxygen anions. For the oxides SiO_2, P_2O_5, etc. the bond between atoms of silicon, phosphorus and oxygen is predominantly a covalent one. Complex chemical compounds have a mixed bond.

SOV/24-58-11-7/42

Determination of the Active Concentration of Slag Components Taking into Consideration the Existence of Ions and of Non-dissociated Compounds

Results of investigations of the distribution of oxygen and P between the metal and slags of various compositions has shown that the complex ions SiO_4^{4-}, SiO_3^{2-}, $(SiO_3)_\beta^{2\beta-}$, PO_4^{3-}, etc., which are present in the free (uncombined) state are unstable and decompose into SiO_2, P_2O_5 and O^{--}. As a result of this the author has assumed in this paper that real slags consist of simple ions Me^{2+}, (Ca^{2+}, Mg^{2+}, Fe^{2+}) and O^{2-} and non-dissociated compounds (silicates, phosphates, etc.). In this paper the author deals predominantly with determining the active concentrations in the system $CaO-SiO_2$ and the subject matter is dealt with under the following paragraph headings: determination of the active concentrations of the components of the slag, taking into consideration ions and non-dissociated compounds; dissociation constants of calcium silicates; determination of the active concentrations of components in the system $CaO-SiO_2$ (the obtained results are graphed

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Determination of the Active Concentration of Slag Components Taking into Consideration the Existence of Ions and of Non-dissociated Compounds

in Figs. 3 and 4 and entered in Table 2); determination of the free and the combined calcium oxide in the silicates (the values calculated from those entered in Table 2, are entered in Table 3 and graphed in Fig.5, from these data it is possible to calculate the active CaO concentration).
There are 5 figures, 3 tables and 11 references, 8 of which are Soviet, 2 English, 1 French.

SUBMITTED: July 8, 1958

Card 5/5

CHUYKO, N.M.

Raspredelenie f osfora mezhdu metallom i shlakom s uchetom s uchetom ionnykh i kovalentnykh svyazey v soedineniyakh shlaka.

report submitted for the 5th Physical Chemical Conference on Steel Production.

MOSCOW 30 JUN 1959

SOV/180-59-1-6/29

AUTHOR: Chuyko, N.M. (Dnepropetrovsk)

TITLE: Determination of the Activities of Oxides in Metallurgical Slags (Opredeleniye aktivnostey okislov v metallurgicheskikh shlakakh)

PERIODICAL: Izvestiya Akademii Nauk SSSR, Otdeleniye tekhnicheskikh nauk, Metallurgiya i toplivo, 1959, Nr 1, pp 29-36 (USSR)

ABSTRACT: The author has previously shown (Ref 1) that slags contain compounds with ionic covalent and mixed bonds and that slag melts contain simple bivalent metal ions and undissociated compounds. He now goes on to the determination of active concentrations of the components in the system $FeO-SiO_2$ and the main metallurgical slags. He maintains that Kheyman's (Ref 3) view that $(SiO_4)^{4-}$ ions decompose to form $(Si_3O_9)^{6-}$ and $(Si_2O_7)^{6-}$ ions in the system $FeO-SiO_2$ is untenable on viscosity considerations and proposes that such melts consist of molecules of undissociated Fe_2SiO_4 and SiO_2 and Fe^{++} and O^{--} ions. He deduces an equation for finding the active concentrations of the slag components and the equilibrium constants of iron silicates and shows how conversion between concentrations can be effected. He shows (Fig 2) the values of the active concentrations in the system as a function of

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Determination of the Activities of Oxides in Metallurgical Slags

the Σn FeO/ Σn SiO_2 ratio and the values for FeO as a function of its weight % at 1500 and 1700°C (Fig 3) and at 1600°C (Fig 4). The latter figure shows the good agreement of points calculated by the author and taken from the literature (Refs 5 and 6). Dealing with the distribution of oxygen between iron and lime-silicate slags the author makes use of the slags of Fetters and Chipman (Ref 5) and shows that his theoretical approach and a simplified calculation method gives good agreement with theoretical data: for this he divides the slags into two groups (with basicities over and under 2). He obtains satisfactory linearity between the active concentrations (Fig 5) without having to make the improbable assumptions previously necessary (Ref 8). Finally the author outlines his determinations of active concentrations of ferrous oxide and lime in steel-melting slags for 140 slag samples of different compositions. The results enable the active concentration to be determined for ferrous oxide

Determination of the Activities of Oxides in Metallurgical Slags

(Figs 7 and 8) and lime (Fig 9) for different basicities and iron and manganese concentrations in the slags.
There are 9 figures, 2 tables and 8 references, 5 of which are English and 3 Soviet.

SUBMITTED: August 27, 1957

CHUYKO, N.M., prof., doktor tekhn.nauk

Theory of the structure of metallurgical slags. Izv.vys.ucheb. zav.; chern.met. 2 no.5:3-10 My '59. (MIRA 12:9)

1. Dnepropetrovskiy metallurgicheskiy institut.
(Slag)

Chuyko, N.M.

PHASE I BOOK EXPLOITATION SOV/4548

Akademiya nauk SSSR. Komissiya po fiziko-khimicheskim osnovam proizvodstva stali

Primeneniye vakuuma v metallurgii (Use of Vacuum in Metallurgy) Moscow, Izd-vo AN SSSR, 1960. 334 p. Errata slip inserted. 4,500 copies printed.

Sponsoring Agency: Akademiya nauk SSSR. Institut metallurgii imeni A.A. Baykova. Komissiya po fiziko-khimicheskim osnovam proizvodstva stali.

Resp. Ed.: A.M. Samarin, Corresponding Member, Academy of Sciences USSR; Ed. of Publishing House: G.M. Makovskiy; Tech. Ed.: S.G. Markovich.

PURPOSE: This collection of articles is intended for technical personnel interested in recent studies and developments of vacuum steelmaking practice and equipment.

COVERAGE: The book contains information on steel melting in vacuum induction furnaces, and vacuum arc furnaces, reduction processes in vacuum, and degassing of steel and alloys. The functioning of apparatus and equipment, especially vacuum furnaces and vacuum booster pumps is also analyzed. Personalities are mentioned in connection with some of the articles and will appear in the Table of Contents. Three articles have been translated from English. Some of the

S/137/61/000/008/011/037
A060/A101

AUTHORS: Chuyko, N. M., Rutkovskiy, V. B., Perevyazko, A. T., Antipenko, G.I., Babkov, T. M., Kurganov, V. V., Frantsev, V. P.

TITLE: Technique for smelting electric steel involving the treatment of the metal by slags in the ladle

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 8, 1961, 36, abstract 8V225 ("Metallurg. i gornorudn. prom-st'. Nauchno-tekhn. sb.", 1960, no. 4, 31-34)

TEXT: A new technique for smelting structural and ball-bearing steels was worked out by the plant "Dneprospetsstal'" and by the Dnepropetrovsk Metallurgical Insitute. The technique provides for the preliminary reduction of the metal by Fe-Mn and Fe-Si or by Si-Mn and the subsequent aftercharging with Fe-Cr. The slag is reduced by ground 75% Fe-Si and coke, the final reduction is carried out by Al bars in the ladle, and the metal is slag-treated on drawing off. The use of the technique in the smelting of various grades of structural and ball-bearing steels in large (55 ton) electric furnaces makes it possible to raise somewhat

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A060/A101

Technique for smelting electric steel ...

the metal quality, to reduce the smelting duration by 20 - 40 min, and reduce the electric power expenditure by 40 - 50 kwhr/ton.

V. Shumskiy

[Abstracter's note: Complete translation]

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80593

S/148/60/000/005/001/009

18.3200

AUTHORS: Chuyko, N.M., Rabinovich, A.G.

TITLE: Elimination of Hydrogen in Blowing Argon Through Metal, Depending on the Blast Method

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Chernaya metallurgiya, 1960, Nr 5, pp 49 - 54

TEXT: Insufficient attention has until now been devoted to the theory of degassing and to the selection of optimum conditions for blowing inert gases through metal. The authors consider the previous method of evaluating the efficiency of metal blast as not sufficiently accurate; the efficiency was determined from the amount of eliminated hydrogen or nitrogen per unit of blown-through inert gas volume, or from the percentage of removed gas in relation to its initial amount in the metal per unit of inert gas volume. It was theoretically and experimentally proved that with an equal volume of inert gas, the amount of hydrogen removed from the metal was proportional to the square of its concentration in the metal. Without taking into account this factor it is not possible to evaluate correctly the degassing effect in

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blowing argon through the metal. Experimental smelts were carried out in a 200-kg induction furnace with a basic crucible. Liquid metal was blown through a tuyère with three apertures of 2 mm in diameter and through one tyuere with 48 apertures of 0.5 mm in diameter. The experiments proved that the efficiency of the degassing method was characterized most accurately by the ratio of the actually removed hydrogen to the theoretically rated amount,

$$V = \frac{\Delta [H]_{act}}{\Delta [H]_{t}} \cdot 100\%$$

[ABSTRACTOR'S NOTE: Subscripts "act" and "t" are translations of the original "fakt" (faktichеskiy) and "t" (teoreticheskiy)], where H_{act} is the actual and H_t the theoretical content of H in the metal. The efficiency of blowing inert gas through liquid metal increases with smaller dimensions of the bubbles, their more uniform distribution in the metal volume and a thicker layer of blown-through metal. The degree of degassing, α, increases with a higher rate of blast and raised argon consumption per unit

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Elimination of Hydrogen in Blowing Argon Through Metal, Depending on the Blast Method

of metal. The described method of blast from below through tuyères with a great amount of small-diameter apertures can be practically used for metal degassing in induction furnaces and small-capacity ladles. There are: 2 tables, 2 graphs and 7 Soviet references.

ASSOCIATION: Dnepropetrovskiy metallurgicheskiy institut i Ukrainskiy nauchno-issledovatel'skiy institut metallov (Dnepropetrovsk Metallurgical Institute and Ukrainian Scientific Research Institute of Metals)

SUBMITTED: July 25, 1959

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S/148/60/000/008/002/018
A161/A029

AUTHORS: Chuyko, N.M.; Rutkovskiy, V.B.; Konishchev, M.P.; Perevyazko, A.G.; Tregubenko, A.F.; Yatskevich, I.S.; Zabaluyev, I.P.; Kurganov, V.V.; Bobkov, T.M.; Antipenko, G.I.

TITLE: A New Smelting Technology Under White Slag for Ball Bearing Steel of Grade ШХ15 (ShKh15)

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. - Chernaya metallurgiya, 1960, No. 8, pp. 38 - 47

TEXT: At the "Dneprospetsstal'" Works up to 1956 ShKh15 steel was teemed simultaneously with slag and no attention was paid to steel treatment by slag in the ladle during the teeming. The final S content of 0.02% was obligatory and the refining took between 2 h 10 min and 2 h 40 min or more. The refining time had been cut down to 1 h 50 min - 2 h 10 min by addition of ferrochrome into non-reduced metal with a content of 0.025% S. To boost the heat process and to improve the metal quality, N.M. Chuyko suggested to cut the refining time to 1 h 10 min or less by deoxidation and desulfuration of the metal with electric furnace slag in the ladle during teeming. The article contains details of this new

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A New Smelting Technology Under White Slag for Ball Bearing Steel of Grade IIIX15 (ShKh15)

technique. The effect of the oxidizing and reducing heat period factors was determined. The formation of highly-basic and well deoxidized slag was mainly studied. The slag quantity used was 4 - 5% of the metal weight with a CaO content of over 55%, FeO below 0.4% and CaF_2 below 2.0%. First a considerable quantity of slag was spilled through a widely open hole into the ladle, and then metal poured from 3 - 4 m height in a solid jet, which brought about a large contact area with slag and rapid deoxidation and desulfuration. The optimum parameters of the oxidation period were stated to be: $\Delta[C] = 0.3 - 0.5\%$ at a carbon burning rate of 0.4 - 0.5%/h, and a metal temperature of 1,545 - 1,565°C before skimming the oxidizing slag. The reducing period under lime-chamotte white slag with low calcium fluoride content proved to be expedient, as well as the treatment of the metal in the ladle by this slag. The optimum slag composition is: $(FeO) < 0.5\%$; $(CaF_2) = 1 - 2\%$; $\Sigma(SiO_2 + Al_2O_3) = 31 - 34\%$; $(CaO) > 53\%$; $(MgO) \leq 12\%$, and $\Sigma(CaO + MgO) = 63 - 65\%$. The optimum metal temperature before teeming is 1,550 - 1,570°C; it ensures the filling of a 2.8-ton ingot during 165 - 190 sec. Final deoxidation of steel by aluminum in the ladle gives a high reduction of oxygen content (over 30%). The quantity of nonmetallic inclusions in

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A161/A029

A New Smelting Technology Under White Slag for Ball Bearing Steel of Grade 15 (ShKh15)

steel was slightly lower than usual in steel smelted in the usual process under carbide slag with long refining. There are 7 figures, 5 tables and 7 Soviet references.

ASSOCIATIONS: Dnepropetrovskiy metallurgicheskiy institut (Dnepropetrovsk Metallurgical Institute); zavod "Dneprospetsstal'" ("Dneprospetsstal'" Works)

SUBMITTED: November 12, 1959

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S/133/61/000/003/012/014
A054/A033

AUTHORS: Perevyazko, A. T., Engineer; Chuyko, N.M., Professor, Doctor of Technical Sciences

TITLE: The effect of the composition of chrome-aluminum steels on the extent of their spotty liquation

PERIODICAL: Stal', no 3., 1961, 267 - 271

TEXT: Spotty liquation is found in several types of carbon, ball-bearings, structural and other steels but, since the mechanism of the origination of this kind of liquation has not yet been fully investigated, no effective measures are known to prevent it. In the Dneprospetsstal' Plant spotty liquation in 1-ton ingots of 38ХМЮА (38KhMYuA) steel reached 6.4. %, in 2.857-ton ingots 18.4 %, in 1959, while in 1958 these figures were 8.6 % and 26.7 %, respectively, The 35 ХЮА (35KhYuA) and 38ХВФЮА (38KhVFYuA) steels are less liable to spotty liquation; the respective figures for 2.857-ton ingots (for 1958) are for the former steel grades 12.1 % and for the latter: 1.79 %, while in 1959 they were: 12.1 and 4.4 %. It was

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The effect of the composition ....

found that spotty liquation develops to a lesser extent in the light-weight ingots of chromium steels, moreover, this defect is more conspicuous in the upper part of the ingot. Table 1 shows that spotty liquation is more pronounced in the 38KhMYuA and occurs under less in the 38KhVFYuA grade steel. As both grades are produced according to the same technology, the difference in the formation of spotty liquation must evidently be put down to the varying aluminum content of these steels: in 38KhMYuA 0.7 - 1.1 %; in 35KhYuA 0.7 - 1.2 %; in 38KhVFYuA 0.4 - 0.7 %. Spotty liquation is also said to be promoted in the 38KhVFYuA steel by tungsten, when present with 0.2 - 0.4 %, and by vanadium (0.1 - 0.2 %), moreover, in the 38KhMYuA steel by molybdenum (0.15 - 0.25 %). This, however, must still be established. Sulfur and phosphorus are elements intensely segregating and enhancing spotty liquation. Their segregation around non-metallic inclusions results in the formation of dark spots. The increase in carbon-content, at an average aluminum-content of 0.9 % furthers spotty liquation as well, while it develops to a less extent when the manganese content of the metal increases, as manganese is apt to form sulfides of a high melting temperature and to impede the liquation of sulfur. Silicium has a similar effect and this can be explained by the increase in the size and the change of

the character of siliceous (non-metallic) inclusions upon an increased silicium content, due to which they emerge and float more easily, while the decrease in the inter-phase surfase on the border of metal and inclusion results in the decrease of liquation. Spotty liquation develops more intensively in the 38KhMYuA and 35KhYuA steels together with the increase in non-metallic inclusions. Their formation and, at the same time, the origination of spotty liquation can be prevented by a thorough deoxidation of the metal with silicium ($\geqslant$0.15 %) and of the slag before alloying with aluminum, as in this case fewer inclusions of finely dispersed aluminum oxide are formed. In order to establish the effect of hydrogen and nitrogen, tests were carried out with various hydrogen (3.4 - 13.0 cm^2/ 100 gr) and nitrogen contents (0.003 - 0.011 %), but they did not effect any change in spotty liquation. Thus, the presence of gases in the metal cannot be regarded as the main cause of spotty liquation, although hydrogen, which generally promotes liquation, may also have some effect on spotty liquation. It was found that as to the technology of smelting, vacuum treatment and pouring spotty liquation developed least a) if rimming is limited to less than one hour, while about 0.5 % carbon is burnt out, at a rate of V_C ~ 0.60 % [C] /h; b) if the

The effect of the composition ....

oxygen content of the metal is low before being alloyed with aluminum. This can be effected by previous deoxidation with coarse silico-manganese or silico-calcium and by a short refining period (not longer than two hours); c) by deoxidizing the slag thoroughly, to a FeO-content of max. 0.5 % during skimming, before aluminum is added to the metal and before tapping the smelt; d) by maintaining the optimum heat conditions during smelting, i.e., the metal temperature should be 1600 - 1630°C at the end of rimming and before tapping; e) when the metal is held long enough in the ladle to bring out non-metallic inclusions. Also the vacuum treatment of the metal decreases spotty liquation; f) when pouring is carried out at an optimum rate (160 -180 sec. for 2.857-ton ingots). As to the mechanism of spotty liquation it was found that it is not identical for all types of steel. In rimming steel spotty liquation is caused by the intense liquation of sulfur, phosphor and carbon, due to gases forming blisters during the crystalization. The so-called gaseous liquation can be observed in steels with an increased gas content, e.g., hydrogen, oxygen or carbonoxides, when the metal is insufficiently deoxidized. In killed steels spotty liquation is caused by finely dispersed, high-melting, non-metallic inclusions, with a highly developed specific sur-

face, which have a tendency to emerge during crystallization, but, due to their small dimensions and low flotation rate concentrate in the upper part of the casting, which is therefore affected most by this defect. The development of spotty liquation is also affected by the rate of crystallization and the viscosity of the metal. Light-weight ingots solidify at a high rate, therefore there is relatively less liquation than in heavy ingots having a lower crystallization rate. 90 - 98 % of the non-metallic inclusions in chrome aluminum steels consist of finely dispersed (1 - 5μ) aluminum, with a melting temperature of 2040°C. This type of liquation is mostly found in steels alloyed for deoxidized intensively by aluminum. The most effective measures against spotty liquation are: 1) to use metal with the lowest possible sulfur and phosphor content, 2) to keep the gas (hydrogen, oxygen, nitrogen) content of the metal very low, moreover 3) to apply a technology which ensures larger sized inclusions. These measures, however, are not absolutely effective for ingots above 2.8 ton. As already emphasized earlier, when introducing coarse silico-calcium (1 kg/t) or ferrosilicium, the sulfur, phosphor and carbon compounds formed with calcium-silicate are arranged uniformly over the entire volume of the casting, thus impeding liquation. The preliminary deoxidation of chrome-

-aluminum steels with the above mentioned agents has been introduced by the Dneprostal' Plant. The recommendation is given to extend the tests by applying cerium, lantane and other rare earth metals. In the tests the following members of the Dneprospetsstal' staff took part: V. P. Frantsov, R. Ye. Danichek, N. A. Karpov, T. M. Vorob'yeva, Yu. G. Volovich and partly: Sun Chen-guan. There are 5 figures, 1 table and 19 Soviet references.

ASSOCIATION: Dnepropetrovskiy metallurgicheskiy institut (Dnepropetrovsk Institute of Metallurgy).

The effect of the composition ...

Table 1: ① Conventional quality class; ② Weight of ingot, t; ③ 1.0; ④ 2.857; ⑤ Steel grades (in brackets: the number of heats); ⑥ KhMYuA (93); ⑦ 38KhMYuA (178); ⑧ 35KhYuA (95); ⑨ 38KhVFYuA(50); ⑩ Number of serviceable castings, %.

TABLE 1

① Условный балл по пятнистой ликвации	② Вес слитка, т			
	③ 1,0	④ 2,857		
	⑤ Марка стали (в скобках—количество плавок)			
	38ХМЮА-(93) ⑥	38ХМЮА (178) ⑦	35ХЮА (95) ⑧	38ХВФЮА (50) ⑨
	⑩ Количество соответствующих плавок, %			
0	46,3	5,0	33,4	65,0
1	45,2	36,5	35,6	23,3
2	4,9	32,0	18,2	7,0
3	1,2	23,3	9,6	4,7
4	2,4	3,2	3,2	0,0

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A054/A033

The effect of the composition ....

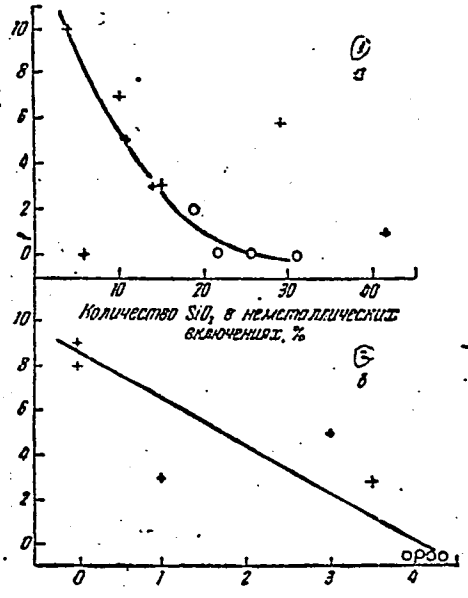

Figure 5: Dependence between the defectiveness of chrome-aluminum steels due to spotty liquation on the silicium content in non-metallic inclusions (1) and on the size of globular inclusions (2). The castings to which calcium silicate was added are indicated with circles and those without calcium silicate-with crosses.

Vertical legend: amount of reject rods in the heat;
Horizontal legend: amount of SiO_2 in the non-metallic inclusions, %; size of globules, quality class.

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S/148/61/000/006/002/013
E193/E480

AUTHORS: Perevyazko, A.T. and Chuyko, N.M.

TITLE: The influence of melting, vacuum treating and teeming technique on the occurrence of spot segregation in chromium aluminium steels

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Chernaya metallurgiya, 1961, No.6, pp.42-52

TEXT: Causes of the appearance of spot segregation in chromium-aluminium steels and methods of its prevention were investigated. The investigation consisted of a statistical analysis of data for 130 heats of steel 38ХМЮА (38KhMYuA), 416 heats of steels 38KhMYuA, 35ХЮА (35KhYuA) and 38ХВФЮА (38KhVFYuA) produced in two different works during 1957-59 and of 36 experimental heats of steels 38KhMYuA and 35KhYuA in which various modifications of melting technique were tried (no details given). It was established that an increased content of sulphur, phosphorus and carbon increases and of manganese, silicon and calcium decreases the appearance of spot segregation. For example, increasing sulphur content from under 0.007% to above 0.01% increased the percentage of defective rods from 19.8 to 28.7%. An increase of

manganese content from less than 0.42% to over 0.47% and of silicon content from the 0.17 - 0.23% range to a 0.31 - 0.37% range decrease the percentage of affected rods from 37.6 to 27.8% and from 37.1 to 29.8% respectively. The content of gases (hydrogen and nitrogen) within the limits encountered (hydrogen from 3.4 to 13 $cm^3/100$ g; nitrogen 0.003 to 0.011%) had no effect on the appearance of the defect. It was established that the main cause of the appearance of spot segregation is an increased content of non-metallic inclusions, particularly finely dispersed alumina. A decrease in the amount of non-metallic inclusions, as well as a change in their composition by replacing alumina with silica which aids the formation of larger globular inclusions assists in decreasing the appearance of the defect. Vacuum treatment of metal in the ladle has little effect on the content of hydrogen and nitrogen in the metal, but a prolonged retention of the metal in the ladle, as well as stirring of the upper layers of the metal with slag helps in the flotation of non-metallic inclusions and thus reduces the appearance of spot segregation. Vacuum treatment of a stream of metal on pouring from one ladle to another decreases the

content of hydrogen and nitrogen in steel. However, at a high residual pressure (above 10 mm Hg) the metal is additionally oxidized during pouring and the degree of contamination by oxide inclusions increases, which in turn promotes spot segregation. In order to obtain high quality metal by this method, the residual pressure should not exceed 1 mm Hg. The mechanism of the formation of spot segregation is explained by the concentration of surface active sulphur, phosphorus and carbon on the boundary surfaces between phases (liquid metal-gas bubble, or liquid metal-non-metallic inclusion) tending to decrease the interphase tensions. In steels 38KhMYuA, 35KhYuA and 38KhVFYuA non-metallic inclusions consist of 90 to 98% of refractory alumina (particle size 1 to 5 μ, melt temperature = 2040°C) due to which these steels are particularly prone to spot segregation. In order to prevent spot segregation in steels, it is necessary to obtain metal with as low as possible content of segregating admixtures (S, P) and gases (hydrogen, nitrogen) and with a low oxygen content, as well as to modify the de-oxidation practice so as to increase the particle size of non-metallic inclusions. On the basis of experimental

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